H.CON.RES. 151

HEARING

BEFORE THE

SUBCOMMITTEE ON FOREST AND FOREST HEALTH

OF THE

COMMITTEE ON RESOURCES
HOUSE OF REPRESENTATIVES

ONE HUNDRED FIFTH CONGRESS

FIRST SESSION

ON

H.CON.RES. 151

EXPRESSING THE SENSE OF THE CONGRESS THAT THE UNITED STATES SHOULD MANAGE ITS PUBLIC DOMAIN NATIONAL FORESTS TO MAXIMIZE THE REDUCTION OF CARBON DIOXIDE IN THE ATMOSPHERE AMONG MANY OTHER OBJECTIVES AND THAT THE UNITED STATES SHOULD SERVE AS AN EXAMPLE AND AS A WORLD LEADER IN ACTIVELY MANAGING ITS PUBLIC DOMAIN NATIONAL FORESTS IN A MANNER THAT SUBSTANTIALLY REDUCES THE AMOUNT OF CARBON DIOXIDE ADDED TO THE ATMOSPHERE

SEPTEMBER 18, 1997, WASHINGTON, DC

Serial No. 105–61

Printed for the use of the Committee on Resources

U.S. GOVERNMENT PRINTING OFFICE

46–036 CC WASHINGTON : 1998

COMMITTEE ON RESOURCES

DON YOUNG, Alaska, *Chairman*

W.J. (BILLY) TAUZIN, Louisiana
JAMES V. HANSEN, Utah
JIM SAXTON, New Jersey
ELTON GALLEGLY, California
JOHN J. DUNCAN, JR., Tennessee
JOEL HEFLEY, Colorado
JOHN T. DOOLITTLE, California
WAYNE T. GILCHREST, Maryland
KEN CALVERT, California
RICHARD W. POMBO, California
BARBARA CUBIN, Wyoming
HELEN CHENOWETH, Idaho
LINDA SMITH, Washington
GEORGE P. RADANOVICH, California
WALTER B. JONES, JR., North Carolina
WILLIAM M. (MAC) THORNBERRY, Texas
JOHN SHADEGG, Arizona
JOHN E. ENSIGN, Nevada
ROBERT F. SMITH, Oregon
CHRIS CANNON, Utah
KEVIN BRADY, Texas
JOHN PETERSON, Pennsylvania
RICK HILL, Montana
BOB SCHAFFER, Colorado
JIM GIBBONS, Nevada
MICHAEL D. CRAPO, Idaho

GEORGE MILLER, California
EDWARD J. MARKEY, Massachusetts
NICK J. RAHALL II, West Virginia
BRUCE F. VENTO, Minnesota
DALE E. KILDEE, Michigan
PETER A. DEFAZIO, Oregon
ENI F.H. FALEOMAVAEGA, American Samoa
NEIL ABERCROMBIE, Hawaii
SOLOMON P. ORTIZ, Texas
OWEN B. PICKETT, Virginia
FRANK PALLONE, JR., New Jersey
CALVIN M. DOOLEY, California
CARLOS A. ROMERO-BARCELO, Puerto Rico
MAURICE D. HINCHEY, New York
ROBERT A. UNDERWOOD, Guam
SAM FARR, California
PATRICK J. KENNEDY, Rhode Island
ADAM SMITH, Washington
WILLIAM D. DELAHUNT, Massachusetts
CHRIS JOHN, Louisiana
DONNA CHRISTIAN-GREEN, Virgin Islands
RON KIND, Wisconsin
LLOYD DOGGETT, Texas

LLOYD A. JONES, *Chief of Staff*
ELIZABETH MEGGINSON, *Chief Counsel*
CHRISTINE KENNEDY, *Chief Clerk/Administrator*
JOHN LAWRENCE, *Democratic Staff Director*

SUBCOMMITTEE ON FOREST AND FOREST HEALTH

HELEN CHENOWETH, Idaho, *Chairman*

JAMES V. HANSEN, Utah
JOHN T. DOOLITTLE, California
GEORGE P. RADANOVICH, California
JOHN PETERSON, Pennsylvania
RICK HILL, Montana
BOB SCHAFFER, Colorado

MAURICE D. HINCHEY, New York
BRUCE F. VENTO, Minnesota
DALE E. KILDEE, Michigan
ENI F.H. FALEOMAVAEGA, Am. Samoa
_____ _____
_____ _____

BILL SIMMONS, *Staff Director*
ANNE HEISSENBUTTEL, *Legislative Staff*
LIZ BIRNBAUM, *Democratic Counsel*

CONTENTS

	Page
Hearing held September 18, 1997	1
Statements of Members:	
Chenoweth, Hon. Helen, a Representative in Congress from the State of Idaho	1
Prepared statement of	2
Statements of witnesses:	
Department of the Interior, prepared statement of	98
Lyons, James R., Undersecretary for Natural Resources and Environment, United States Department of Agriculture	3
Prepared statement of	27
Oliver, Chadwick D., Professor, University of Washington, College of Forest Resources	15
Perez–Garcia, John M., Associate Professor, College of Forest Resources, University of Washington	13
Prepared statement of John M. Perez–Garcia, Associate Professor, College of Forest Resources, University of Washington and Chadwick D. Oliver, Professor, University of Washington, College of Forest Resources	46
Ross, Gordon, County Commissioner, Coos County, Oregon	17
Prepared statement of	29
Affidavit of Gordon Ross	70
How Much Old Growth Can We Save?	97
Additional material supplied:	
Briefing Paper	27
Evergreen, magazine, question and answer	94
Forest and Wood Products, Role in Carbon Sequestration, R. Neil Sampson	34
Text of H.Con.Res. 151	31

HEARING ON: H.CON.RES. 151, EXPRESSING THE SENSE OF THE CONGRESS THAT THE UNITED STATES SHOULD MANAGE ITS PUBLIC DOMAIN NATIONAL FORESTS TO MAXIMIZE THE REDUCTION OF CARBON DIOXIDE IN THE ATMOSPHERE AMONG MANY OTHER OBJECTIVES AND THAT THE UNITED STATES SHOULD SERVE AS AN EXAMPLE AND AS A WORLD LEADER IN ACTIVELY MANAGING ITS PUBLIC DOMAIN NATIONAL FORESTS IN A MANNER THAT SUBSTANTIALLY REDUCES THE AMOUNT OF CARBON DIOXIDE ADDED TO THE ATMOSPHERE.

THURSDAY, SEPTEMBER 18, 1997

HOUSE OF REPRESENTATIVES, SUBCOMMITTEE ON FORESTS AND FOREST HEALTH, COMMITTEE ON RESOURCES,
Washington, DC.

The Subcommittee met, pursuant to notice, at 10 a.m. in room 1334, Longworth House Office Building, Hon. Helen Chenoweth (chairman of the Subcommittee) presiding.

STATEMENT OF THE HON. HELEN CHENOWETH, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF IDAHO

Mrs. CHENOWETH. The Subcommittee on Forests and Forest Health will come to order. The Subcommittee is meeting today to hear testimony on H.C.R 151. I would like to welcome our witnesses today. I am very pleased to be holding this hearing on H.C.R. 151, a concurrent resolution expressing the sense of the Congress that the United States should manage its public domain national forest to maximize the reduction of carbon dioxide in the atmosphere among many other objectives and that the United States should serve as an example and world leader in actively managing its public domain public forests in the manner that substantially reduces the amount of carbon dioxide added to the atmosphere.

[Text of bill H.Con.Res. 151 may be found at end of hearing.]

Mrs. CHENOWETH. Chairman Young and I introduced this resolution along with Speaker Gingrich, Mr. Taylor of North Carolina, Mr. Herger, Mr. Peterson of Pennsylvania, Mr. Pombo, Mr. McInnis, Mr. Sessions, Mrs. Smith of Washington, Mr. Riggs, Mr.

Cunningham, Mrs. Cubin, Mr. Nethercutt, Mr. Doolittle, Mr. Lewis of California, Mr. Skeen, Mr. Schaffer of Colorado, Mr. Hansen and Mr. Radanovich.

Global warming has been an issue of great debate and discussion in Congress. Whether or not you believe human induced global climate change is occurred, this resolution deserves the support of everyone. Science has proven to us that carbon dioxide, the leading greenhouse gas, can be taken out of the atmosphere by allowing a young vibrant forest to absorb carbon through a photosynthesis. Carbon dioxide can also be kept out of the atmosphere by harvesting the forest before it begins to decompose or burn, thus storing the carbon in wood products that are environmentally friendly as well as providing an economic benefit to society and to communities.

In the words of Gifford Pinchot quoting from his book Breaking New Ground, he states, "the purpose of forestry, then, is to make the forest produce the largest possible amount of whatever crop or service will be most useful, and keep on producing it generation after generation." I agree with these sage words and feel that we must manage our forests better. One of the things that we must begin to do is to improve the management of the national forests to maximize the benefit to our environment.

In December of this year, the United Nations Framework Convention on Climate change, which may commit the United States to mandatory greenhouse gas reductions, is expected to be signed in Kyoto, Japan. The ramifications of this treaty could be enormous for people in the United States, our economy and our way of life.

There are alternatives to mandatory reductions of carbon emissions. One alternative is to manage our public forests better in order to extract from the atmosphere and store more carbon dioxide than we currently do. This means giving and using the controls on greenhouse gases that mother nature gives to us rather than controls that government mandates this nation to follow.

President Teddy Roosevelt said, "we have a right and a duty second to none, to protect ourselves and our children against the wasteful development of our natural resources, whether that waste is caused by the actual destruction of such resources or by making them impossible of development hereafter." Our charge then is to strike a proper balance in the management of our forests to maximize the benefits to the environment and prevent the wasteful development and destruction of our natural resources.

The thrust of this resolution is to direct the Federal Government to take the lead in managing our national forests to reduce the levels of carbon dioxide in the atmosphere. By managing our public domain national forests to minimize additions of carbon dioxide into the atmosphere we will improve air quality, the health of our Nation's forests and set an example for other nations as the world prepares for the negotiations in Kyoto, Japan.

[The prepared statement of Ms. Chenoweth follows.:]

STATEMENT OF HON. HELEN CHENOWETH, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF IDAHO

I would like to welcome our witnesses out today. I am very pleased to be holding this hearing on H.Con.Res. 151, a concurrent resolution expressing the sense of the Congress that the United States should manage its public domain National Forests

to maximize the reduction of carbon dioxide in the atmosphere among many other objectives and that the United States should serve as an example and as a world leader in actively managing its public domain national forests in a manner that substantially reduces the amount of carbon dioxide added to the atmosphere.

Chairman Young and I introduced this resolution along with Speaker Gingrich, Mr. Taylor of North Carolina, Mr. Herger, and Mr. Peterson of Pennsylvania, Mr. Pombo, Mr. McInnis, Mr. Sessions, Mrs. Smith of Washington, Mr. Riggs, Mr. Cunningham, Mrs. Cubin, Mr. Nethercutt, Mr. Doolittle, Mr. Lewis of California, Mr. Skeen, Mr. Schaffer of Colorado, Mr. Hansen, and Mr. Radanovich.

Global warming has been an issue of great debate and discussion in Congress. Whether or not you believe human induced global climate change is occurring, this resolution deserves the support of everyone. Science has proven to us that carbon dioxide, the leading greenhouse gas can be taken out of the atmosphere by allowing a young vibrant forest to absorb carbon through photosynthesis. Carbon dioxide can also be kept out of the atmosphere by harvesting the forest before it begins to decompose or burn, thus storing the carbon in wood products that are environmentally friendly, as well as providing an economic benefit to society.

In the words of Gifford Pinchot quoting from his book *Breaking New Ground*, he states, "the purpose of Forestry, then, is to make the forest produce the largest possible amount of whatever crop or service will be most useful, and keep on producing it generation after generation . . ." I agree with these sage words, and feel that we must manage our forests better. One of the things that we must begin to do is to improve the management of the National Forests to maximize the benefit to the environment.

In December of this year, the United Nations Framework Convention on Climate Change, which may commit the United States to *mandatory* greenhouse gas reductions, is expected to be signed in Kyoto, Japan. The ramifications of this treaty could be enormous for people, the economy and our way of life.

There are alternatives to mandatory reductions of carbon emissions. One alternative is to manage our public forests better in order to extract from the atmosphere and store more carbon dioxide than we currently do. This means using the controls on greenhouse gasses that mother nature gives to us rather than controls that government mandates us to follow.

President Teddy Roosevelt said, "we have a right and duty second to none, to protect ourselves and our children against the wasteful development of our natural resources, whether that waste is caused by the actual destruction of such resources or by making them impossible of development hereafter." Our charge then is to strike a proper balance in the management of our forests to maximize the benefits to the environment and prevent the wasteful development of our natural resources.

The thrust of this resolution is to direct the Federal Government to take the lead in managing our National Forests to reduce the levels of carbon dioxide in the atmosphere. By managing our public domain national forests to minimize additions of carbon dioxide to the atmosphere we will improve air quality, the health of our nation's forests and set an example for other nation's, as the world prepares for the negotiations in Kyoto, Japan.

Mrs. CHENOWETH. And when the Ranking Minority Member arrives, I will recognize him for a statement. But now I will introduce our first panel, Mr. Jim Lyons, Undersecretary of Natural Resources and Environment, Department of Agriculture. Mr. Lyons, good to see you again.

Mr. LYONS. Good to see you.

Mrs. CHENOWETH. Mr. Lyons, would you proceed.

STATEMENT OF JAMES R. LYONS, UNDERSECRETARY FOR NATURAL RESOURCES AND ENVIRONMENT, UNITED STATES DEPARTMENT OF AGRICULTURE

Mr. LYONS. Thank you, Madam Chairman, and I want to apologize up front for the delay in getting testimony to you. We focused on some issues in the Senate the last few days and therefore, we were not able to focus in on this important matter, so I do apologize. I am also glad to see that you have been reading Breaking New Ground, which I gave you just the other day, so——

Mrs. CHENOWETH. That is right. I am enjoying it very much.

Mr. LYONS. Very good. I am glad you are into it. I want to thank you for the opportunity to appear before you today to discuss the Administration's views regarding the active management of the national forests to maximize reduction in carbon dioxide in the atmosphere. We welcome the Congress' attention to this matter and concern for arresting, or at least addressing, global climate change, and we look forward to working with you in that regard. However, we must oppose H. Con. Res. 151 because of its narrow focus and perhaps its conflict with existing national forest management policy and legal direction.

The premise of the concurrent resolution is that young, fast-growing trees fix carbon dioxide more efficiently than mature trees, and therefore, the Forest Service should maximize carbon sequestration by harvesting mature trees, converting the wood to durable products and replanting sites with seedlings, which will then take up carbon at a faster rate.

As the Committee is aware, the scientific basis for our mutual concerns about global climate changes is extremely complex. Accordingly, our efforts to make substantive policy changes are equally complex and driven by scientific analysis. What I would like to do this morning is make three basic points or address three basic issues. One is the role of recycling in dealing with this issue; the second is the role of the national forests in the carbon cycle; and the third is the potential for carbon sequestration from Federal lands as opposed to private lands.

The Forest Service Research Program has done some extensive research quantifying the benefits of recycling wood fiber on carbon releases into the environment. Through technology developed by the Federal Government and the private sector and supported by government incentives to recycle, the U.S. has made significant contributions to carbon sequestration by reducing energy costs of production and by reusing wood fibers several times before it ultimately ends up in landfills or disposed of in some other way.

Recognizing the value of storing carbon in wood products and substituting wood products for more fossil fuel-consuming products, the President included in his 1993 Climate Change Action Plan, a proposal to extend paper recycling technology research. Priorities included research on the use of recycled wood and fiber in durable structural products suitable for the housing market. The President requested $2 million in increased funding for that research, however, unfortunately, only $200,000 was appropriated.

The President's Forest Plan in the Pacific Northwest was analyzed specifically for its contribution to carbon sequestration. It thus offers, I think, a good case study to evaluate national forest management policies in general. Since a great deal of time and effort has been placed on the development of that plan. Contrary to the presumption of the concurrent resolution, the conservation strategy and the President's Forest Plan actually increases the amount of carbon dioxide sequestration by about 7 million metric tons per year by the year 2000. A careful balance was struck in forest protection and management in seeking to protect old-growth forests as described well in a 1990 Science magazine article by Harmon, Ferrell and Jerry Franklin, one of the key architects of the plan.

In addition, the President's Forest Plan adopted strict standards harvesting so as to minimize the environmental effects of harvesting timber in the so-called matrix lands into the Forest Plan. And this approach, in fact, is supported by the work of R. Neil Sampson, who has testified before this Committee many times. Neil found that harvesting practices, such as clear cutting, eliminate canopy shade, increase soil temperatures, accelerate organic decomposition due to soil disturbance and have other negative impacts on carbon storage in the forested ecosystem. Since the Forest Plan minimizes clear cuts and focuses on protecting shade, foliage and canopy closures and, of course, minimizing ground disturbance because of the potential effects on water quality, the plan seems consistent with the recommendations of Mr. Sampson.

Lastly, the President's Forest Plan meets all Federal land management and environmental laws and your resolution would create, I believe, a conflict with existing law. While the resolution suggests that national forests should be managed to maximize carbon sequestration, current law requires us to practice, of course, multiple use as requested by the philosophy of Gifford Pinchot and others. U.S. forest sector will store about 109 million metric tons of carbon in the year 2000. Of this, the national forests are projected to fix 21 million metric tons of carbon, store over 8 billion tons, as well as conserve biodiversity and provide for multiple use according to our legal mandates. And although the annual carbon storage and private forests is expected to decline over the next several decades due to the declining net growth in the Northeast, as trees age and removal of trees in the South increases, probably at the same rate as growth, annual carbon accumulation in our national forests is expected to increase.

Finally, what I would like to do, Madam Chairman, is turn to the issue of maximizing growth of new biomass through forest management and how we best would capture that to achieve the goals that I think are part of your concurrent resolution. As you know, the productivity of forest land varies widely across the United States. Productivity, that is the rate at which trees grow or wood is accumulated, biomass is accumulated, is influenced by soil type and soil depth, growing season, rain fall, and many other factors. Productivity is commonly measured according to the number of cubic feet of wood which one acre of land could grow annually in a year's time. If Congress were interested in maximizing carbon sequestration through tree growth, I would suggest that is more logical for us to focus on investing in those most productive sites which will grow trees the quicker. Now I know you know this, Madam Chairman, but I just want to point out that 73 percent of the forest land in the United States is actually in private ownership, 59 percent, almost two thirds, is owned by what we refer to as nonindustrial private forest landowners, 14 percent of that is owned by the industry. Of the remaining 27 percent of land, which is in public ownership, the Forest Service administers 17 percent. The Forest Service published a document called Forest Resources of the United States (1994), which summarizes forest productivity across all land ownerships using the standard of 85 cubic feet per acre per year as a rate of production. In the West, for example, the Forest Service notes that 67 percent of the private industrial lands are capable of pro-

ducing more than 85 cubic feet per year compared to only 15 percent on the national forests. The reason for this is that national forest lands are typically high elevation lands with shorter growing seasons, are often on steep slopes and poor sites. In fact that is why they are in public ownership and they have been referred to in the past as the lands that no one wanted. As Americans moved West and homesteaded, they, of course, homesteaded in those lands that were easier to access, that were more productive, that could support what then, of course, was an agrarian economy.

Similarly, in the East, 55 percent of the private industrial land is capable of producing 85 cubic feet or more a year compared to only 20 percent of the national forest land. This trend is the same, though less dramatic, between nonindustrial private lands and national forest lands in both East and West. And in fact if you were to look at a breakdown of land ownership types by productivity, you would find—industry lands, industrial lands are the most productive by far. Private nonindustrial lands are second. National forest system lands are third, and other public lands, lands administered by the BLM, Department of Defense and others are last in terms of productivity.

My point is this, if growing trees quickly is our goal or the goal of the resolution, so as to maximize carbon sequestration, in my mind, it makes much more sense to focus our efforts to areas where we will receive the greatest return on our investment, in our investment in terms of carbon sequestration. That is on the most productive lands, i.e., private lands.

The Forest Service can help make this investment, not through a change in priorities in our land management of public lands, but by providing technical and financial assistance to private landowners to help them increase their productivity. The state and private forestry programs of the Forest Service, and your staff and I were most recently out with the State Forest Meeting in Salt Lake City to discuss these programs, can deliver exactly this kind of assistance to landowners. In addition, the National Resources Conservation Service administers a number of programs which help landowners develop and implement plans that promote tree planting. The more efficient and effective place to focus tree planting in aggressive management really is on private lands. The President's Climate Change Action Plan includes two actions that provide technical assistance and cost-sharing assistance for nonindustrial private landowners to plant trees and improve forest management.

I would note, however, Madam Chairman, that in the budget for the Forest Service for fiscal year 1998, which was passed by the House and is being debated over on the Senate floor, the investment that is made in programs like stewardship and stewardship incentive, which are designed to help increase productivity on private nonindustrial forest lands is one tenth the investment we are making in producing timber on the national forests, which as I have just pointed out have a much lower capability to sequester carbon given their lower productivity. I would suggest if carbon sequestration were a goal, then we want to reverse that investment.

The programs that we currently have in place, stewardship and stewardship incentive, have resulted in tree planting on about 135,000 acres of land. Many states, as you know, are seeking to fos-

ter a good stewardship and encourage good land management on private and industrial lands. The State of Idaho, for example, the State of Alaska have forest practices acts. These laws continue the efforts to insure that landowners practice sustainable forestry. Some states, however, such as Georgia, do not in fact have forest practices laws. And they depend on market conditions to encourage tree planting. I would suggest another policy change that we are not responsible for, but the states are responsible for, is policies that would insure and encourage tree planting immediately after harvest. In any case, the role of the private landowner, however, is influenced by state or Federal policy and we believe that private landowners have a much greater opportunity to contribute to the carbon sequestration goals that this concurrent resolution suggests.

There are many efforts throughout the Forest Service and the Administration which are targeted specifically to address the issue of climate change that are beyond the immediate scope of this resolution and hearing. However, in summary I want to tell you that the Administration is enthusiastically supportive of the concerns of the Congress in addressing global climate change, however, believe that the resolution is too narrowly focused and, in fact, would be counter to the other legal mandates we have for management of the national forest.

I think I will stop there, Madam Chairman, and entertain any questions you might have.

[The prepared statement of Mr. Lyons may be found at end of hearing.]

Mrs. CHENOWETH. That is very interesting testimony and I did not—I was not able to study it ahead of time because, as you say, we did not receive it until last night. But I am a little surprised at it and Mr. Lyons, I have to say, you are one of the brightest men that I have met, but I am not sure that I understand the logic here at all. So I want to take this step by step and would ask, even though I know you are running between here and the Senate, I would ask that you remain for the second panel because I may want to call you back.

I am not sure given the comments that you just gave us that there is a way to reasonably and logically convince the Administration to support this concept, however, I am very, very surprised at some of the, at some of the statements because we seem to be abandoning the tradition set forth by Gifford Pinchot and Teddy Roosevelt, the National Forest Management Act, and did I, did I understand you to say that you feel that the focus of the work by the Forest Service in managing land should be working with private landowners on their own private land to manage their forests?

Mr. LYONS. Well what I meant to suggest, Madam Chairman, we in fact do do a great deal of work with, with private nonindustrial landowners, some with private industrial landowners, in helping to promote good stewardship of their land through the state and private programs that are run through we call a Cooperative Forestry Assistance Authorities. If we were to focus intently on carbon sequestration as a goal of land stewardship and forest management, that in fact is where we would want to focus our efforts because of the benefits of capitalizing on the higher productivity of those

private lands. So if that were the case and that was our sole goal, I would suggest that is where we would be making investments.

Mrs. CHENOWETH. Let us look at the land mass. I think you used the figure 73 percent of our forested land is on nonFederal land. Of that 73 percent, 14 percent of the 73 percent are used for commercial harvest.

Mr. LYONS. Well, they are industrial lands technically. They are owned by the Weyerhaeusers and the Plum Creeks and the Boise Cascades.

Mrs. CHENOWETH. Right.

Mr. LYONS. Some of the nonindustrial land contributes to commercial ventures as well and produces wood products. In fact a sizable portion.

Mrs. CHENOWETH. So calibrating that out, that would amount to about 10.2 percent of our landbase that you are talking about. And our Federal lands, our timber dominated Federal lands are 27 percent of our landbase. And so we are abandoning not only the National Forest Management Act, but twice the landbase, and the landbase that is primarily concentrated in the Northwest, a whole sector of our country.

Mr. LYONS. I want to make sure we get the numbers right so, so we can start from the same bases. Of the entire United States, the forest landbase in the United States, 73 percent is in private ownership.

Mrs. CHENOWETH. Right.

Mr. LYONS. OK, so really three quarters of our forest are in private ownership. Of the remaining forest land in the United States, which is in public management, 17 percent is administered by the Forest Service. So we have 17 percent of the 27 percent that remains. So we have a relatively small slice of the pie in terms of the total forest landbase that we administer. The most dominate share, and I wish I had a pie chart that I had yesterday to show you, is in private ownership.

Mrs. CHENOWETH. I do not think it quite comes out that way but I will review your testimony.

Mr. LYONS. Well it is not true in Idaho. I will grant you that.

Mrs. CHENOWETH. And many of our Northwestern states. But it is my understanding that President Clinton, as said in his speech last Tuesday, September 9th, that "we could reduce global warming pollution by 20 percent tomorrow with technology that is already available at no cost, if we would just change the way we do things." Does the Clinton Administration consider managing our national forests to maximize reductions of carbon dioxide in the atmosphere to be a "technology that is already available at no cost if we just change the way we do things."

Mr. LYONS. Well, I would suggest, Madam Chairman, that we are seeking to manage the national forests so as to achieve that as one of many, many goals and objectives. We are managing those goals to achieve the goals that you cited in the quotation from Breaking New Ground, to assure the production of crops as Pinchot referred to them, and other goods and services that emanate from the national forests on a sustainable basis. Carbon sequestration is one element of many.

Mrs. CHENOWETH. Neil Sampson wrote in Forest and Wood Products Role in Carbon Sequestration, that "if our object is to increase carbon storage over time, however, then harvest and replanting becomes the best option." Do you not agree with that statement?

Mr. LYONS. I agree totally, but the key there is where do you make that investment? Where do you harvest? And where do you seek reforestation? And my point is simply this. With the productivity of private lands being so much greater than the productivity of public forest lands, that is where you are going to make that investment.

Mrs. CHENOWETH. And it appears that your plans are then to pretty well shut down the Northwest.

Mr. LYONS. No, I would not say——

Mrs. CHENOWETH. Let me finish my question.

Mr. LYONS. OK.

Mrs. CHENOWETH. The Forest Service trust funds are nearly gone. A GAO study has just come in that the press just reported on that the Forest Service is near bankrupt in its trust funds. We are having to lay off employees up in—large numbers of employees up in the Northwest in various regions. It is a desperate situation up there. We have the Forest Service now asking for fees for services that were there for the people. I mean the argument over the last few years have been these lands belong to the people and yet we are charging people now to simply go in and gaze at these lands. And so we are transferring the ability of the Forest Service to generate income from the trust funds to now be for access in camp grounds, on cabins, in just our natural and national forests. It seems to be a great departure from the National Forest Management Act.

And while I am personally concerned and I know the Congress is that the Forest Service does not go bankrupt and does not break both its management and economically, we have got to be able to manage the forests not only economically for the best return, but for the best return in the atmosphere, and that does not mean just on private ground. It means in a whole segment in the Northwest. You know, the Forest Service has gone from harvesting around 12 billion board feet of timber each year to well below 4 billion board feet. From 12 billion to below 4 billion. And that—therein lies the problem. That is the picture. Is this trend beneficial to the forest's ability to sequester carbon, when we, as Neil Sampson has said in his, in his paper would—very, very well done—that this idea of reducing harvesting and replanting with good healthy trees wars against what we are trying to achieve in the balance of oxygenation and carbon dioxide sequestration. Do you agree with Mr. Sampson and that statement?

Mr. LYONS. As, as I said, I agree with Mr. Sampson that one way to increase carbon sequestration is through harvest replanting of productive sites. And I would suggest that if you ask Neil—I will let you ask Neil, I do not know if he is going to testify today or not—that he would suggest that focusing on the highly productive sites would be, would be the most productive way to go.

You mentioned the point of going bankrupt. I would suggest this, if you look at the unit cost of production of timber on the national forest as opposed to the unit cost of producing the same amount of

timber from private industrial and nonindustrial lands, I think you would quickly decide if you were responsible for the entire forest landscape, you would not be investing a lot of money in, in Federal lands to produce timber, because the unit costs are astronomical compared to that on private lands. We still invest in timber production on the national forests for various reasons. To support communities, to achieve wildlife habitat improvement, to protect watersheds, to achieve other goals.

You mention Neil Sampson's excellent work on this issue of carbon sequestration. Neil points out, for example, that forest fires emit enormous amounts of carbon and can cause tremendous harm over time. The policies we have adopted to reduce fuel loads, to increase thinning and to restore fire—to fire adapted ecosystems in the long term will help reduce wildfires and the emissions of high amounts of carbons. So I think that is a beneficial outcome from what we do.

Neil also points out in the same paper, though I want to mention, that the practice of clear cut harvesting attracts negative public reaction for various reasons, as he suggests. Then he goes on to talk about the fact that the Forest Service has declared a new policy minimizing the use of clear cutting as a harvest method wherever other methods are available. In fact that policy was adopted during the Bush era, not the Clinton era. But Neil points out, "this should be a positive change in terms of carbon sinks and the effects of forest harvest upon them."

My point is simply this, there are a lot of factors that come, come into play. Changes in management practices can help improve the role the national forest can play in carbon sequestration. But if as the Concurrent Resolution suggests, we should focus solely on as a primary objective, trying to improve carbon sequestration, we do not want to focus on increasing timber harvest on the national forest. We want to focus on increasing land stewardship on 75 percent of the landbase that is forested and in addition, converting marginal lands to forested lands where trees can grow and can begin to accumulate carbon as other forests do.

Mrs. CHENOWETH. I am very—I guess I did not believe that you would say that. I guess that it has taken me a long time to realize that there has been a paradigm shift of emphasis in the Forest Service from that of good stewardship management in the Northwest to, as you say, of being of assistance to the private landowners. I hope you are not saying that the Forest Service has become an assistant to big business at the expense of—and no doubt about it, I mean we have huge companies here in the East that are, that are doing very, very well and they are responding to market demand, and their forests are giving off great amounts of oxygen and they are maximizing the carbon sequestration because of the way they manage their forests. But I submit to you, Mr. Secretary, we are, we are abandoning an entire area in this United States that is quickly growing out of, out of balance as far as our ability to reduce fuel loads, to limit the potential of carbon being released into the atmosphere because of fire, because of unit costs. I do not think that is a good argument.

I realize you are making me very testy and this is the first time that this has happened since I have been Chairman, but I am ut-

terly shocked at what I am hearing. And I hope that you will review this or, or submit more detail into your testimony so that we come closer in our thinking as far as, No. 1, your appearance of abandoning National Forest Management Act, and the appearance of abandoning an entire area in management in the Northwest and in California.

Mr. LYONS. If I could, Madam Chairman, I want to, I want to make clear we are certainly not abandoning our stewardship role. I infer from your statement though that you equate stewardship with timber harvesting and harvesting levels. The fact that harvest levels have declined or offer levels have declined from 12 billion board feet in some a decade or so ago, to 4 equates with abandonment of stewardship, that is not the case. I want to be abundantly clear about that. Stewardship involves harvesting trees, replanting new trees, restoring water sheds, dealing with the road maintenance and deterioration problems that we have on the national forests, providing high quality recreation, good range land improvement, et cetera, et cetera. So that is all part of our stewardship mission as required in the law. And I certainly do not mean to create friction between the good working relationship we have.

I simply want to point out that I think, I think it is wrong to manage the national forest for any one purpose. I think that is consistent with your opening statement. It is wrong to manage the national forest simply for carbon sequestration. If we want to manage forests for carbon sequestration, we would invest elsewhere. We would not invest in the national forests. We want to manage the national forest for the wide range of goods and services they can provide on a sustainable basis to help people. People in Idaho and Washington and Oregon and California, and in the East as well. And that is really our stewardship role and that is where we are headed.

This Concurrent Resolution would change our priorities and have us focus on carbon sequestration. I think the implication is that we would harvest more. That is really the wrong way to approach our stewardship role, and it is really the wrong way to achieve the carbon sequestration goals that are suggested. If the Concurrent Resolution suggested that forests nationwide should be managed to improve carbon sequestration, well then we might have a focus on which we could discuss. Because as I suggested private lands offer tremendous opportunity to capture more carbon through their productive use.

Mrs. CHENOWETH. H.C.R. 151 expresses the sense of the Congress that the U.S. should manage its public domain national forest to maximize the reduction of carbon among other objectives and that was made very clear in my opening statement and in the content of the resolution. The resolution does not require that carbon sequestration should be given a higher priority while at the same time meeting all Federal land management and environmental laws.

My question is could the objectives of this resolution be achieved while at the same time following all of our other environmental laws? I think it could. And I totally agree with you about the fact that we should not manage the forest for one single purpose,

whether it be a theological purpose, whether it be for carbon sequestration, whether it be simply for harvesting.

But as I have mentioned before from their chair and in letters to you, we are in a desperate situation out in the Northwest. And I think that, that the shock that was registered by our leadership team who came out and viewed the forest in the Northwest, is evidence of the fact that we really, really need some attention paid to our forests in the Northwest for the sake of forest health.

So let me just finish with one more question. Some of the groups have advocated no commercial harvest of timber from our national forest. They seem to be winning the battle today over the logic whether it is based on a balance in our forest, whether it is based on fuel reduction, whether it is based on carbon sequestration, whatever it may be. They seem to be winning the battle that we should have absolutely no commercial harvest of timber on our national forest. Now we have a very minimum amount now and we are not keeping up with the need just for forest health. Do you support this policy for the Northwest?

Mr. LYONS. Well, Madam Chairman, the Administration does not support the elimination of commercial timber harvesting on the national forests.

Mrs. CHENOWETH. What implication would this policy have on our national forest's ability to sequester carbon if we, if we simply did not harvest anything?

Mr. LYONS. Well obviously it would have some impact in those areas where productivity would, would be lost. And would also hamper our ability to make forest improvements for—purposes or to reduce fuel loads and therefore, reduce the risk of wildfire, et cetera. And that is one of the reasons we continue to invest in commercial and noncommercial vegetative management on the national forests.

Mrs. CHENOWETH. Mr. Secretary, I am going to let you off the hook for right now. I do want to personally study your testimony and I will be submitting questions to you personally. I would like for you to stay, if you could. We only have three more witnesses.

I do want to say that I very, very much appreciate the book about Gifford Pinchot that you sent and I dove right into it. I also want to say that I have most of the Presidential papers of Teddy Roosevelt in my office, and I am going to copy some of them and send them to you. He gets into addressing the issue about deforestation in China and how the natural resources were abused because there was massive clear cutting and it created a difference in the entire climate because of the lack of aspiration and because it changed the entire complexion of the soils because of great erosion. We have heard for a long time of decertification. It is not entirely fictional. It is not going to happen in the Northwest. But we are getting close to a point where there is a massive area that is not responding well and healthily in the Northwest and I am greatly concerned about this. And I think Teddy Roosevelt really hit the nail on the head. I think he had great, great wisdom and great vision. So if you do not mind, I would like to share that with you and would be very interested in your personal opinion on that.

Mr. LYONS. I greatly appreciate that.

Mrs. CHENOWETH. So thank you very much, Mr. Secretary.

Mr. LYONS. Thank you.

Mrs. CHENOWETH. And I appreciate your time.

The Chair now recognizes the second panel. Dr. John Perez-Garcia, Associate Professor at University of Washington, Seattle, Washington. Dr. Chad Oliver, Professor at University of Washington, College of Forestry Resources in Seattle, Washington, and Gordon Ross, County Commissioner Coos County, Coquille, Oregon.

Gentlemen, I am very pleased to welcome you to the hearing and very pleased to have your addition to the hearing record, which will be very valuable to us in the future. And before we get started with the testimony, I wonder if you could please rise and take the oath.

[Witnesses sworn]

Mrs. CHENOWETH. I have just been advised that we do have a vote and it is at the second bell it looks like, so I am going to have run and vote. And I think it is a procedural vote, is it not, Kathy? Procedural vote. And so I will cast that vote and I will be right back. So we will just temporarily adjourn.

[Recess]

Mrs. CHENOWETH. The hearing on H.C.R. 151 will resume. We look forward to the testimony from Dr. Garcia. Doctor.

STATEMENT OF JOHN M. PEREZ–GARCIA, ASSOCIATE PROFESSOR, COLLEGE OF FOREST RESOURCES, UNIVERSITY OF WASHINGTON

Dr. PEREZ–GARCIA. Thank you, Madam Chairman. What I would like to do today is summarize the findings of our July 7th, paper presented to the Committee on how forests can help reduce carbon dioxide emissions to the atmosphere. There are four points that I would like to make today; three of them relate to carbon dioxide, and one, the last point I would like to make, relates to tradeoffs, which I think is something that should be discussed here.

Carbon dioxide is reduced by forest growth. I think everyone understands this statement and accepts it. There are two points that you need to realize with this statement though. One, there is a limit to the amount of carbon that a forest can capture, remove from the atmosphere and save as biomass. Second, these forests are subject to disturbance so they can quickly return that carbon to the atmosphere.

The importance of the limit to the amount of carbon that forests can sequester is a technological one. Carbon storage can further be increased by transferring that carbon out of the forest into products. And I think there is general agreement in this statement also. The point to recognize here though is that there is a limit to the amount of carbon that can be transferred from forest to products. Depending on the type of management, the type of forest and the product that is associated with them, this increase in the capacity of forest to sequester carbon can range from 10 to 66 percent according to several studies.

The way forest management increases carbon sequestration is to concentrate growth in timber that is utilizable. What forest management is doing is concentrating the growth, the carbon, into something that we can take out of the forest and preserve as product pools.

The forest type affects carbon storage through its different growth rates, different regions and different species composition. Forests across the U.S. grow differently and therefore, sequester carbon at different rates.

Wood products affect carbon storage since they hold carbon captured by the forest in terrestrial form and delay its return to the atmosphere. Short-lived wood products return carbon faster than long-lived wood products. So things like paper would return carbon faster to the atmosphere than the solid wood products like lumber. Wood products also save terrestrial carbon when they displace fossil fuel energy through either direct substitution by use of biofuels or indirect substitution through manufacturing process energy.

And this is the third point that I would like to bring out: Forest products saves fossil fuel carbon. And that is perhaps one of the more important things I would like to leave with you today. Wood products used in construction, furniture and other wood product uses extend the storage capacity of forests by physically transferring the biomass carbon to a product carbon pool. But there is also a savings in fossil fuel carbon associated with the use of products. The savings occur because wood products use less manufacturing energy derived from fossil fuels than it's competing non-wood products.

The effect on atmospheric carbon of fossil fuels displaced by wood products may be large. Studies that I and others have conducted estimate the effect of less wood products used through national harvest reductions to be around 19 million metric tons. This effect alone is larger than the estimated U.S. average annual increase in carbon dioxide emissions from 1990 to 1995, which is about 14 million metric tons. The 14 million number is important because that is really a target set by the President's Climate Change Plan. This also is important because it says something different than what the Secretary was stating with regard to the impact national forests have on atmospheric carbon.

The last point I would like to make is about tradeoffs. By far the most effective way to keep carbon out of the atmosphere is to use wood products and save fossil fuel energy. I would like to reiterate that point. Planting and growing more forests can take carbon out of the atmosphere and can be effective as long as these plantations do not substitute more productive plantations for carbon sequestration. Large scale planting programs have a limit to their potential to capture atmospheric carbon and may even reduce long term carbon storage of forest if the use of wood is not increasing at the same rate as these plantings.

As an example of tradeoffs, take the reduction of harvest from Federal forest which has led to greater carbon admissions nationally and internationally. Other forest areas within and outside of the U.S. increased their harvest to replace a portion of the lost Federal timber harvest. These areas are less productive than those they replaced, contributing to greater amounts of carbon emission through less product recovery and greater acreage required to substitute the lost harvest. The amount of harvest reduction not made up by other producers has led to greater use of non-wood substitute products. This indirect substitution effect through the use of more fossil fuel-based manufacturing energy has further increased car-

bon emissions associated with Federal timber harvest. The Federal policy to preserve habitat illustrates unintended consequences of single issue policies such as carbon emissions.

In summary, there are three points that I would like for the Committee to remember. One, forest sequestered carbon; second, wood products act as a reservoir of forest carbon extending the forest's capacity to move carbon out of the atmosphere; and thirdly, by far the most effective way to keep carbon out of the atmosphere is to use wood products and save fossil fuels. Thank you, Madam Chairman.

[The prepared statement of Dr. Perez–Garcia may be found at end of hearing.]

Mrs. CHENOWETH. Thank you, Dr. Garcia. That was very interesting, very technical, but very good and very interesting.

Dr. Oliver, welcome, it is good to see you again. Dr. Chad Oliver, Professor at University of Washington, College of Forest Resources.

STATEMENT OF CHADWICK D. OLIVER, PROFESSOR, UNIVERSITY OF WASHINGTON, COLLEGE OF FOREST RESOURCES

Dr. OLIVER. Thank you very much, Madam Chairman. I would like to build on what Dr. Perez–Garcia said and maybe I can clarify some of the apparent confusion with what Mr. Lyons had said. Mr. Lyons was basing the idea of sequestering carbon by growing the forest or keeping the wood in the forest and not harvesting it on the paper of Harmon, et al, of 1990. That paper shows that forests basically, if you keep the forests and do not harvest it, you will store a lot of carbon. A paper of 1993 by Kershaw, et al, in the Journal of Sustainable Forestry, showed that that is only true if by not using the wood you do not use more polluting substitute products, such as steel, aluminum, brick and concrete. If, however, you do use—do not harvest the forest but instead use these—utilize these substitute products, you add far more carbon dioxide to the atmosphere than if you used—if you had harvested the forest and used those wood products. The interesting thing there is then that actual harvest of the forest and utilizing of it actually reduces the total carbon dioxide addition to the atmosphere by saving on the use of fossil fuels, because you do not use substitute products.

The second point there was a bit confusing is that actually you could use more of the wood to substitute for these more polluting products if you grow the forests on—for high quality timber as opposed to short rotation type of wood, timber management, thinning the forest, grow into high quality wood which would substitute for other beams. Therefore, rather than saying the contrast is between preservation on the one hand and short rotation on the other. Actually you are better, apparently, you are better savings of carbon dioxide would be longer rotation, high quality. Which, incidentally, would also provide many of the habitat values from the forest before it is harvested.

Now planting and growing more forests on presently marginal agricultural lands will temporarily reduce your carbon dioxide as the forest is growing. Once it is ready to harvest, as Dr. Perez–Garcia pointed out, unless you have an expanding use of wood, that wood will just substitute for wood from another place and you will, actually calculations will show you will not get an increase—a re-

duction in carbon dioxide but may actually be adding more carbon dioxide to the atmosphere. The net results—the net point here is that wood use and expanded wood use where it substitutes for products that need more fossil fuel is the best way to keep carbon dioxide out of the atmosphere by keeping the fossil fuels in the ground. That is something that the Harmon, et al, paper that Mr. Lyons referred to did not consider, but subsequent papers have considered.

Now I want to—this brings, brings up the whole issue of tradeoffs. On the one hand, some people want reserves such as national forests, and on the other hand, other people want to conserve carbon dioxide, which is best done, by far the best way is by utilizing wood to substitute for alternative products. Now the problem is of single issue advocacy. If we simply get into we must have absolute carbon sequestration, we must have absolute reserves, then you end up with a polarized position. What really needs to be done as a resolution is decide how much of each of these values we value, and is there a way to provide both of these to certain extents.

As a tradeoff, for example, we might not want to ever harvest the Olympic National Park. But just accept that that is a tradeoff that we are going to give up a certain amount of possible sequestration, but then how much other area do you also set aside recognizing that the tradeoff is more carbon added to the atmosphere and the resolution that you put forward here points out this carbon dioxide reduction among many other values gets to that tradeoff consideration. Now, on the other hand, you can decide there is certain areas you are willing to give up the carbon sequestration by setting aside as national parks. There are ways of supplementing those with other areas where you could manage by doing such things as thinning or selection cutting to create some of that habitat to a large extent, but at the same time, harvesting it providing the high quality wood that would also lead to your carbon sequestration. So that you could look at a mixture of these, but it is a matter of tradeoffs among the different issues.

Basically we need to look at it from the point of view of forest management is not necessarily managing all forests for a single way or a single value. The decision is how much forests in each region of the world do we manage and in which way in order to provide the greatest balance of values recognizing if we set aside more forests or do not manage them, or do not harvest them in one area, we are increasing the CO_2 by the use of substitute products as well as by harvesting forests elsewhere. I hope that is helpful.

[The prepared statement of Dr. Oliver may be found at end of hearing.]

Mrs. CHENOWETH. It is Dr. Oliver. Do you have anything else you would like to add in your testimony?

Dr. OLIVER. I believe everything else is in here. I will be glad to respond to questions.

Mrs. CHENOWETH. And Dr. Perez–Garcia, do you have anything else you would like to add in testimony?

Dr. PEREZ–GARCIA. No, I believe I have said everything that I wanted to say and I will also be happy to answer any questions that you might have.

Mrs. CHENOWETH. Thank you, and I do have some. Mr. Gordon Ross, I have been looking forward to your testimony. Please proceed.

STATEMENT OF GORDON ROSS, COUNTY COMMISSIONER, COOS COUNTY, OREGON

Mr. ROSS. Madam Chairman, if you will forgive me, I would like to also quote from the greatest because I remember a quote from Gifford Pinchot after spending three years on the Olympic Peninsula said that he had not seen a single Douglas fir seedling under the canopy nor an opening that was not filled with them, and my remarks have to be confined to the Douglas fir region because that is the only region I am familiar with. I am a local historian as well as county commissioner in Coos County. I have been giving discussions on local history and the development of transportation, how it effects the way we live, for about 30 years now and the matter of, of carbon going into the atmosphere always becomes a part of that if we look at the different energy sources as we use up our energy savings account.

In 1976, I thought this was going to resolve itself when the first gas crunch came and the gentleman, Bill Bradbury, and myself, Bill became President of the Senate years later, in Oregon Senate, we put on a little half hour television program called, "We're Going Back to Horses Because We're Running Out of Dinosaurs." But my predictions are not any better than my authority. As you notice, maybe I have no credentials and my predictions do not come true either.

In 1991, I gave testimony before the Endangered Species Committee in Portland, Oregon, and I put this in the record all 22 pages of it. No pride in authorship here at all. But it makes good evening reading. Judge Harvey Switzer took it home and read it and came back for a second day of testimony, taking it a paragraph at a time, and finally it was all admitted into the record over the objections Sierra Club Legal Defense Fund. But I would just turn to page four where we deal with four myths. A myth in Oregon about forestry is something that is believed inside of Portland or some parts of Eugene. Myth fourth was that setting aside old growth timber will provide future generations with clean air. And the response is the amount of oxygen a forest releases into the atmosphere, the amount of carbon dioxide a forest takes into its—takes in, is in direct proportion to the amount of wood fiber produced. When a forest is mature it has no net gain of wood fiber. There is no longer a net benefit to the atmosphere. It is oxidizing as fast as it is growing.

In Oregon we can grow 50,000 board feet per acre per year—excuse me, 50,000 board feet in 60 years. And this is what we are doing on our Coos County forest. I have to qualify that. And in the past few years, that was '89 to '91, the average old growth sale on our Federal lands produced 42,000 board feet per acre. A net loss.

I have also given you two pages from technical bulletin No. 201, U.S. Department of Agriculture showing the growth rates of Douglas fir and the mean advantage or the mean average volume increase. On Table 16 is described below and about a 90 year, a 90-

year harvesting cycle would maximize growth and therefore, maximize both timber production and the carbon sequestration.

I have given you a color graph and I want to call your attention to the graph at the bottom of this color page, it shows the U.S. growth and removals in billions cubic feet per year. Notice in 1920 our lands were only producing about 6 billion cubic feet per year while our harvest was a challenge harvest of over twice that amount. By harvesting and replanting each year, we see that the growth increase. Until now we are harvesting less than is growing, and of course, in the Northwest now on the approximately 25 million acres in the Douglas fir region, that has been reduced substantially.

If half of the Douglas fir region, under Federal ownership were in mature status, then it would be breathing with just one lung, you might say. This half of it would be, would be not giving any net benefit to oxygen released in the atmosphere or to carbon storage. Under the present record of decision, only about 10 percent is going to continue in harvest management. Eventually 90 percent will be in old growth. Some call this good forest health. But if it is only breathing with 10 percent of its lung capacity, I think a doctor would call it acute emphysema.

I want to conclude by saying that I have also given you a copy of something that I authored here called How Much Old Growth Can We Save. In the Northwest, all of our stands of Douglas fir timber are either the result of catastrophic fire, or timber harvest. And if we should listen to history, we should certainly listen to it now. We cannot save those stands from ultimate harvest. Either if we do not harvest them, nature will. And nature will put all of the carbon dioxide, all of the carbon back into the atmosphere through the initial burning and through the subsequent deterioration afterwards, and she will not distribute the receipts very well either. Thank you.

[The prepared statement of Mr. Ross and attachments thereto may be found at end of hearing.]

Mrs. CHENOWETH. Thank you, very much. I do have some questions here for Dr. Perez–Garcia. I have questions for all of you, but Dr. Perez–Garcia, what is the impact to the atmosphere to moving to a less active timber program?

Dr. PEREZ–GARCIA. In terms of carbon dioxide?

Mrs. CHENOWETH. Yes.

Dr. PEREZ–GARCIA. It probably would increase the emissions of carbon to the atmosphere.

Mrs. CHENOWETH. And the overall greenhouse gasses effect.

Dr. PEREZ–GARCIA. Well carbon dioxide is one of the greenhouse gasses, so if you increase that gas, it would probably increase greenhouse gasses. But I am less confident in that statement than knowing that it will increase carbon emissions to the atmosphere.

Mrs. CHENOWETH. For the record, would you please tell us what are the effects of catastrophic wildfires on air quality and on carbon sequestration.

Dr. PEREZ–GARCIA. Like I said in my statement, forest are subject to disturbances, and one of these disturbances would be wildfires. As a matter of fact those wildfires release carbon from its

terrestrial form into carbon in its atmospheric form, which is carbon dioxide. So it would increase carbon dioxide emissions.

Mrs. CHENOWETH. Can you tell us what has been the effect of stopping the harvest of wood from our national forests on global additions of greenhouse gases?

Dr. PEREZ–GARCIA. There have been two effects to this and this is documented in a study conducted under EPA sponsorship. One effect is a national effect and one is an international effect. Nationally, the effect of reduced harvest, Federal harvest, has been to increase carbon dioxide emissions and to decrease the absorption of carbon. The way that occurs is through substitution of regions which produced the timber that is not produced by the Federal timber, i.e., the South will produce more, but it is not as productive in sequestering carbon as the Pacific Northwest. The international effect is similar and it also increased carbon emissions internationally. And the reason there was that some of the timber replacement for the Federal timber comes from countries like Chile, New Zealand, the former Soviet Union, which are less productive in sequestering carbon than the Pacific Northwest.

Mrs. CHENOWETH. That is interesting. We have gone from a harvest of around 12 billion board feet to below 4 billion board feet of timber. What effect has this had on the global greenhouse gases?

Dr. PEREZ–GARCIA. It has been to increase carbon emissions.

Mrs. CHENOWETH. Dr. Perez–Garcia, I will have other questions for you that I will submit in writing. Is that all right with you?

Dr. PEREZ–GARCIA. Yes.

Mrs. CHENOWETH. And we would like to be able to complete the circle of getting the questions to you and the answers within three weeks.

Dr. PEREZ–GARCIA. That will be fine.

Mrs. CHENOWETH. Dr. Oliver, can old growth be made a part of a forestry management scheme that means to maximize reduction of the greenhouse gases?

Dr. OLIVER. Well, as I mentioned earlier, it is a question of tradeoffs on if you set aside an area of old growth and leave it and do not harvest it, then you force either wood to be harvested in other areas or what is happening more and more is you force the use of substitute products, such as steel studs in homes, which increase the amount of carbon dioxide to the atmosphere. On the other hand, it is a question of tradeoffs. How much of this old growth are you willing to set up in exchange for having a little bit more carbon dioxide into the atmosphere for these other uses. There are other ways of possibly managing by managing on long rotation, selective cut, and creating old growth-like conditions, and at some time harvesting the trees, or as the area blows down, salvaging the trees so that they can be used in another area be used in this old growth condition. I want to point out just as a caveat, that if you are concerned about biodiversity, you would not want all of your forest in this old growth condition, because not all species can live there. But it is a question of tradeoffs in that leaving the forest there and not doing anything with it but using substitute products, as we are increasingly doing, is basically adding more carbon dioxide to the atmosphere.

Mrs. CHENOWETH. From your testimony, you point out that greater utilization of higher grade wood is one of the best ways to maximize reduction of greenhouse gases. I would like you to elaborate on this if you would for us.

Dr. OLIVER. Some of the high grade timbers have both some of the more valuable properties for structural uses and because they are strong, knot-free, et cetera, they can be used in lesser weights and therefore, lesser amounts in things such as high quality construction. These can then be substituted for such things as steel reinforced concrete, et cetera. And if that is done, then you save you from having to produce the concrete and steel, and therefore, you keep fossil fuels from being used, and you keep the carbon in the ground instead of the atmosphere. So high quality wood seems to have a very important effect in keeping the carbon in the ground.

Mrs. CHENOWETH. And another thing, too, is these alternative materials are all nonrenewable, are they not?

Dr. OLIVER. Yes, they are nonrenewable. Actually, there is another point. The higher quality wood often means more sequestration in the forest before the time they are harvested.

Mrs. CHENOWETH. The Forest Service has gone from harvesting about 12 billion board feet down to about 4 billion board feet. Is this trend beneficial to the forest's ability to sequester the carbon?

Dr. OLIVER. Actually, I would like to, if you do not mind looking at page eight of the testimony, figure five, it gets to this issue. And I would like for Garcia to explain it in detail. Do you have this figure before you? I think it is an important figure.

Mrs. CHENOWETH. Please proceed.

Dr. OLIVER. Excuse me. Do you have it—OK. Basically what it is is the MMTCE is million metrictons of carbon equivalent per year. Just shows the total amount of carbon. Just think of that as carbon dioxide. And then John will proceed with showing the effects both of the target reduction in carbon dioxide and the calculated effects of stopping the harvesting in the national forest. Looked at it, calculating at different levels. John could you proceed? Dr. Perez–Garcia.

Dr. PEREZ–GARCIA. Sure, the first bar at the top of the graph where it says fossil fuel consumption has the number 14. I always like to put things into perspective and so you must think of the 14 as the perspective that you want to look at. The 14 comes from the annual average increase in carbon dioxide emissions from 1990 to 1995, i.e., it is a target that some have proposed to reach in terms of reducing carbon emission. So that the 14 is really a baseline number, OK?

When we look at the second bar below that, we had fossil fuel consumption carbon emission plus the habitat preservation in the Pacific Northwest. These activities have increased carbon dioxide by 20 million metric tons of carbon equivalent. OK, so 14 of those is from the fossil fuel target, plus six from the habitat preservation program. So now our target really is not 14, it is 20. OK?

Now if we add in substitution of non-wood products, i.e., the fossil fuel used to produced non-wood products that we lost with the reduced Federal harvest, we add another 19 million metric tons to that bar. So now our target is really 39 rather than 14. And then there are two levels of wildfires. There is an estimated low level

and an estimated high level of fires and these activities increase the carbon emissions from 50 million metric tons of carbon equivalent, to I forget what the big number is, close to 80 million metric tons of carbon equivalent. And that number you might think of as our target that we need to reach.

The whole idea here was to show how some of the previous single-issue policies that were implemented affect carbon dioxide emissions, and that these effects can be very large.

Dr. OLIVER. So instead of the initial target of trying to reduce carbon dioxide emission by 14 million metric tons, we have actually increased it so that to get to the base level, we would have to reduce it between 54 and 75 million metric tons, cause we have added that much more carbon by these policies, both not harvesting and the fire problem that we have.

Mrs. CHENOWETH. This is very interesting. Can you tell me what effect salvage logging would have on CO_2, Dr. Oliver or Dr. Perez–Garcia?

Dr. PEREZ–GARCIA. I would expect it to transfer the carbon that is on the ground into products. If those products are long-lived products, i.e., they are lumber, then that carbon remains in lumber for a period longer than it would have been on the ground.

Mrs. CHENOWETH. I see.

Dr. PEREZ–GARCIA. And there is also the substitution effect with the fossil fuels. So the salvage logging would reduce the amount of carbon entering the atmosphere. If you leave it on the ground, it will decompose and go into the atmosphere.

Dr. OLIVER. If you would have the effects of if you did not salvage log, then instead of using the wood products, there is a high change you would use substitute products, which would add more carbon to the atmosphere. If you had fires or if the salvage was after fires, if you had reburns, and you would add more carbon to the atmosphere. If you had salvaged it and you had thinned it, then you may even be growing higher quality products on the remaining trees, which can further reduce the carbon dioxide on the atmosphere.

Mrs. CHENOWETH. Very interesting. I am pleased to recognize Mr. Schaffer from Colorado has joined us. I would like to proceed with questions for Mr. Ross right now.

Mr. Ross, I want to let you know that I think Coos County is just about the most beautiful part of the world there is. My sister lived in Coos Bay and I always enjoyed visiting your corner of the world. I understand that that specific coast area there is the most highly productive—has the most highly productive capability for growing and harvesting trees than any place else in the world. Is that true?

Mr. ROSS. Madam Chairman, I was actually called to task for making that statement before Harvey Switzer, Federal Magistrate, because I had not been everywhere in the world. I thank you for your compliments about Coos County. We had a person come there a few years ago to set about to stop harvesting timber in the County and he said that he was from California, and we had the most beautiful place in the world and he was here to save it. And I said, Dr. Miller, you are late. It burned off in 1868, we have logged it twice since then.

Mrs. CHENOWETH. You are right. Do you believe the harvest of timber should be the primary use of the national forests?

Mr. ROSS. Madam Chair, if I may, I certainly believe it should be one of the primary uses. When it is dealt as one of the primary uses, using best management practices, of course, and latest technology, we can preserve all the other amenities. Furthermore, we get all the other amenities free. You alluded to this earlier today. In Coos County, I have constituents now that are having to pay $3 to go look at the Pacific Ocean because the Forest Service is out with their tin cup trying to stay alive with no harvest and no means of support. I certainly think that when you maximize timber harvest, you maximize the ability for, or the benefit to the atmosphere, plus you get jobs, you get county revenues for public health and safety, and you get materials for people to build houses with for Americans to live in. And it is tragic to what is happening to the Douglas fir region. Knowing what I know, what I know is in inevitable. My forebears saw the Siuslaw National Forest when it was ashes. And that is one of the reasons, and Mr. Lyons is absolutely correct, the reason people did not take much of that land is because it was not what they wanted. It was not because it was not productive. It was because they were agrarian in nature, they needed a place to grow food. This was just going to grow little trees and it did not have timber on it then.

That forest is probably one of the most productive forests in the world, and I will have to couch that probably now because of what I have been told in the past about saying things I cannot substantiate. But today under the record of decision, there is almost no place on that forest we can hold a timber sale because of the intermittent stream buffers, the overlap. Sometimes they triplicate in areas. And so the productivity of that forest is—it is beautiful. It is 130-year-old timber on about two thirds of it, one third of it has been harvested and is growing. The roads are in. The roads are managed and we have mills in the area being dissembled because there is nothing there for them to harvest. They cannot harvest it.

Mrs. CHENOWETH. I understand the big mill downtown is no longer operating.

Mr. ROSS. That is right. Yes.

Mrs. CHENOWETH. What is in there now?

Mr. ROSS. A casino.

Mrs. CHENOWETH. A casino?

Mr. ROSS. Yes.

Mrs. CHENOWETH. Good grief.

Mr. ROSS. And the Coquille Indian tribe has a casino in there. It is the only mill in town that is working three shifts a day.

Mrs. CHENOWETH. The casino.

Mr. ROSS. It is called the Mill Casino as a matter of fact.

Mrs. CHENOWETH. I am going to ask you one more question and then I am going to yield to Mr. Schaffer. How will increasing the harvest of timber to increase carbon storage affect our salmon runs?

Mr. ROSS. Madam Chair, we have harvested more timber than any county in Oregon. Principally because we started earlier. We started in 1855. We had the only deep water port on the Oregon coast. And we supplied timber to build San Francisco and to re-

build it after the fire in 1906. We continue to and for most of my lifetime and for decades before my lifetime, we are the largest timber shipping port, wood products shipping port in the world. And yet we have the highest rate of salmon returns on the Oregon coast. We have more Coho salmon return to the streams every year in Coos County than all of the rest of the coastal counties in Oregon put together. Now this was our experience. I had no scientific background for it until this year.

Oregon State University is completing a 10-year study on the coastal productivity enhancement program understanding how managing our riparian areas effect salmon runs. And it is been determined that these are disturbance based ecosystems. The large woody debris and the spawning gravel are essential for our salmon runs, are a result of disturbances. In the past forest fires and flood, but today logging and flood. And this work has been done by the same people that drew the lines on the FEMAT report and they are telling me that this needs to be revisited, that they did not understand this at the time they drew the lines. And when they drew the lines, they did not consider them to be permanent. Only until watershed assessments could be done and you could determine where the timber needed to be left on the head walls that might fail. Not so they would not fail, but when they did fail, large woody debris would come into the proper places in the watershed. And they are telling me maybe 10 percent of the watershed could be saved in that area and the rest harvested. And we would be doing something really meaningful for our aquatic resources.

So it is—besides the other tragedies of the Northwest forest plan, it is exactly wrongheaded when it comes to anadromous fisheries. We all thought that these beautiful little brooks and shaded areas must be the place that fish like. But fish like what comes from disturbances. The large woody debris that creates the sheltering areas that salmon need to overwinter and oversummer, and the spawning gravel that they need. So Madam Chair, I appreciate you asking that question and giving me an opportunity to respond to it.

Mrs. CHENOWETH. Thank you, sir. The Chair now recognizes the gentleman from Colorado, Mr. Schaffer.

Mr. SCHAFFER. Thank you, Madam Chairman. Commissioner, I saw one of your bumper stickers. It said, housing——

Mr. ROSS. I made this available. Sometimes I try to make a point——

Mr. SCHAFFER. Oh, here it is, "Affordable Housing Begins in the Woods." What is the story on this?

Mr. ROSS. If I may, is Mr. Lyons still here? I apologize to him because I did not send him one. I sent one to Mike Dombeck when I read in the Oregonian that he and Mike Dombeck had been before a subcommittee in Congress, and I do not hold everybody accountable for what I read in the Oregonian either, my apologies if this is reported wrong, but they had said that it was not the Administration's policy to not harvest timber on public lands. They were only reflecting the wishes of the people of the United States. So I wrote to Mike, knowing him, and I said, Mike, I have always followed whenever I see your name, I read it and this is what I wrote, ask the people of the United States the right question. And do not ask them while they are watching Bambi on television. Ask

them when they are arranging financing for a new home or when they are at the lumber yard, or when the mortgage payment is due or when the landlord is collecting the rent. And then ask them the question, how much more are you willing to pay for shelter, for housing, to not harvest timber on public lands. And that was the reason I sent that. And I made it available for your Committee also.

Mr. SCHAFFER. Thank you. I would also like you to discuss, if you would a little bit, just the role of controlled burns and fire with respect to forest management form your perspective as a county commissioner.

Mr. ROSS. Thank you. For many years we managed our timber in Coos County by harvesting, burning, and then replanting. And it is certainly an aid in allowing the young seedlings to get a jump on the brush that grows so fast on the coast. But fire in a natural role in a Douglas fir region is not an option. It is very different in the pine area. But in the Douglas fir region, things grow so fast, you are not going to reduce the fire loading long term by little, frequent, nonintensive burns. The Douglas fir region is famous for only the catastrophic events that take place after timber reaches maturity. And that certainly is not an option, we need to harvest to prevent that from happening.

The real danger in Western Oregon is at the same time we are not harvesting, the same time the fuel is building up, we are also losing the biggest fire department ever assembled in the world. At every foreclosure, at every bankruptcy, at every sale held to sell out the equipment that the timber companies have had and the logging companies have had, we lose that fire department, which is made of the loggers and their water wagons and Caterpillars and Lowboys to move the Caterpillars to the sites, and fire fighting equipment, and manpower and just plain know-how. And we are losing that fire department at the same time it is going to be needed the most. Certainly public safety is paramount in the thinking of this County Commissioner.

Mr. SCHAFFER. When you say fire department, you are referring to just the whole community, not——

Mr. ROSS. I am referring to the many, many, many contract loggers that have gone out of business. They were the first response. Now they were not the certified fire fighters, but they believe in putting fires out. They did not understand how to monitor fires and how to take these 27 objectives and determine whether you are going to let it burn or not. They knew if you did not put it out, it was going to burn up the whole country, and it was going to do it quick, and the quicker you can get on it, and that was our first response capabilities.

The Coos Force Protective Association, which is an association of all of the private and public landowners in Southwestern Oregon is reluctant to do a complete closure even when humidity gets high. They would rather do a hoot owl where you start early in the morning and you go home by noon and, and so that they know where these people are. If you do a complete closure, the Cat operator, the Lowboy driver, he goes home, he throws the fishing equipment in the car, he takes the wife and the kids and heads for a lake in the Cascades, and you do not know where he is at. So they

recognize the need for these—for this as their first response capability on these fires.

Mr. SCHAFFER. I have one more question as well, the debate on status of the purchaser road credits. The debate continues on the purchaser road credits, it is cut in half here on House side. I think that is taking place, I think, this week over in the Senate, to some degree, that is true. With respect to your community, can you speak to that issue and the effect it has on your——

Mr. ROSS. There is two issues here and I faxed information to both Senator Wydon and Senator Patty Murray on this issue day before yesterday. Because those road funds are needed so that we can maintain the roads and keep the sediment from going in and impacting our anadromous streams. What the well-maintained road system is what is important to parts of forest health as it applies to the aquatic resources.

The other part of that was to take away the purchasers credits. This is a program that has worked so well. Under the old program, you sold a timber sale knowing that a road was going to have to be put in and the amount that they paid for that timber sale reflected the fact that they were going to have to build the road, build it according to the standards which were predetermined. With the purchaser credits, people bid on forest service sales as though the road is there. So they pay top price and then they build the road and when something else needs to be done, if you need a culvert that will allow fish passages as opposed to what has been described, change orders could be made so, so easily. This is not any kind of a subsidy to business. This is a matter of just building the road and using credits rather than selling at a lower price and allowing them to build the road predetermined. And it is one of our best tools in forest management and forest health when we can design those roads and make change orders as it goes along rather than the more difficult way of changing something once it has already been in the contract.

Mr. SCHAFFER. What is going to be the results——

Mr. ROSS. Well the result was last night 51 people in the Senate had better sense. It failed 51 to 49.

Mr. SCHAFFER. Assuming though that if those who oppose purchaser road credit program prevail, if that were to occur, with respect to forest management, this whole issue of atmospheric impact, and so on, what would be your guess on what your county would look like without road purchaser credit program?

Mr. ROSS. It would adversely impact the sale program. It would be one more thing taking away from the managers that has been a tool for the good environment. And they have been losing those tools rapidly.

Mrs. CHENOWETH. Dr. Oliver, I have some more questions that if you do not mind that I would like to ask you. What about wood as an energy source. What effect would utilizing woody biomass as a replacement for fossil fuels have on the levels of carbon in the atmosphere?

Dr. Oliver. Well, I will ask John Perez–Garcia to add to this as well, but wood can be harvested and used as an energy source and thereby keeping fossil fuels in the ground. However, in terms of the efficiency of using wood in that way versus using wood as a direct

product that would substitute for something like concrete or steel or aluminum or brick, you save a lot more energy and keep a lot more carbon dioxide out of the atmosphere than using wood as a substitute product. The way it would probably be most effective would be to use as much of the wood as possible as a substitute product, and use the residuals, the chips, the shavings, the sawdust to then be burned as energy to save for fossil fuels. Dr. Perez–Garcia, is that basically correct?

Dr. PEREZ–GARCIA. Yes, I would agree with what Dr. Oliver has stated. Basically, one of the bottom lines that I said in my presentation this morning was that the way to reduce atmospheric carbon is to save fossil fuels. Wood products do that. And there are two ways that wood products do that. One is directly substituting fossil fuels for biofuels, and the second way is indirectly substituting the manufactured energy that is based on fossil fuels through wood product production.

Mrs. CHENOWETH. Very interesting. Well, gentlemen, I do have other questions that I would like to submit to you. But for right now I am going to ask Mr. Schaffer if he has anything to add. I do want to say that I very, very much appreciate your coming across the country to join us in this hearing. Your testimony has been invaluable, and I appreciate it very much. The members of the Committee may also have additional questions for the witnesses and we will ask that you respond to these in writing. The hearing will be held open for those responses for three weeks.

If there is no further business, the Chair again wants to thank Mr. Schaffer for joining us. We have three Subcommittee hearings going on out of this main Committee today, and so a lot of the members who wanted to be here simply could not be here. But as of now this Subcommittee stands adjourned.

[Whereupon, at 12 p.m., the Subcommittee was adjourned.]

[Additional material submitted for the record follows.]

BRIEFING PAPER

H.CON.RES. 151, CONCURRENT RESOLUTION REGARDING MANAGING PUBLIC DOMAIN NATIONAL FOREST TO MAXIMIZE REDUCTION OF CARBON DIOXIDE AMONG OTHER OBJECTIVES

Summary

The Subcommittee on Forests and Forest Health will meet on Thursday, September 18, 1997, to hold a legislative hearing on H.Con.Res. 151, a concurrent resolution Expressing the sense of the Congress that the United States should manage its public domain National Forests to maximize the reduction of carbon dioxide in the atmosphere among many other objectives and that the Unites States should serve as an example and as a world leader in actively managing its public domain national forests in a manner that substantially reduces the amount of carbon dioxide added to the atmosphere.

Background

Chairman Don Young (R-AK) introduced H.Con.Res. 151 along with Speaker Gingrich, Mrs. Chenoweth, chairman of the House Resources Subcommittee on Forests and Forest Health, Mr. Taylor of North Carolina, Mr. Herger, and Mr. Peterson of Pennsylvania, Mr. Pombo, Mr. McInnis, Mr. Sessions, Mrs. Smith of Washington, Mr. Riggs, Mr. Cunningham, Mrs. Cubin, Mr. Nethercutt, Mr. Doolittle, Mr. Lewis of California, Mr. Skeen, Mr. Schaffer of Colorado, Mr. Hansen, and Mr. Radanovich expressing the sense of Congress that the United States should manage its public domain national forests to maximize the reduction of carbon dioxide in the atmosphere.

Global warming has been an issue of great debate and discussion in Congress. This is due to the fact that in December of this year, the United Nations Framework Convention on Climate Change meets in Kyoto, Japan. The Clinton-Gore Administration has stated publicly that they intend to commit the United States to *mandatory* greenhouse gas reductions at the convention in Kyoto, Japan.

Science has proven to us that carbon dioxide, the leading greenhouse gas can be taken out of the atmosphere by allowing a young vibrant forest to absorb carbon through photosynthesis. It is stored as wood. Carbon dioxide can also be kept out of the atmosphere by harvesting the forest before it begins to decompose or burn, thus storing the carbon in wood products that are environmentally friendly, as well as providing an economic benefit to society.

The most extensive scientific work on this subject has been conducted by Dr. John Perez-Garcia, Associate Professor, University of Washington, Dr. Chadwick Oliver, Professor, University of Washington, Bruce Lippke, Professor and Director of the Center for International Trade in Forest Products and R. Neil Sampson. A copy of their studies can be obtained from the Subcommittee.

Staff Contact: Bill Simmons, Staff Director, Subcommittee on Forests and Forest Health at X5-0691.

STATEMENT OF JAMES R. LYONS, UNDER SECRETARY FOR NATURAL RESOURCES AND ENVIRONMENT, UNITED STATES DEPARTMENT OF AGRICULTURE

Mr. Chairman and Members of the Subcommittee:

Thank you for the opportunity to appear before you today to discuss the views of the Administration regarding the active management of the National Forests to maximize the reduction of carbon dioxide in the atmosphere. The Administration welcomes and supports efforts to address climate change, but strongly opposes House Concurrent Resolution 151 because it is misguided and undermines current national forest management laws.

The premise of the concurrent resolution is that young, fast-growing trees fix carbon dioxide more efficiently than mature trees. Therefore, the Forest Service should maximize carbon sequestration by harvesting mature trees, converting the wood to durable products, and replanting sites with seedlings.

As the committee is aware, the scientific basis for our mutually shared concerns about global climate change is very complex. Accordingly, our efforts to make substantive policy changes are equally complex and driven by scientific analysis. I want to make three basic points today: (1) the role of recycling, (2) the role of national forests in the carbon cycle, and (3) the potential for carbon sequestration from Federal lands compared with private lands.

The Forest Service research program has done some extensive research quantifying the benefits of recycling wood fiber on carbon releases into the environment.

Through technology developed by the Federal Government and private industry, and supported by government incentives to recycle, the United States has made a significant contribution to carbon sequestration by reducing energy costs of production and reusing wood fiber several times before sending it to a landfill.

Recognizing the value of storing carbon in wood products and substituting wood products for more fossil fuel-consuming products, the President included in the 1993 Climate Change Action Plan a proposal to expand paper recycling technology research. Priorities included research on the use of recycled wood and fiber in durable structural products suitable for housing markets. The President requested a $2 million increase in research funding. Congress has appropriated $200,000.

The President's Forest Plan was analyzed specifically for its contribution to carbon sequestration, and thus offers a good case study to evaluate national forest management policies in general. Contrary to the presumption of the concurrent resolution, the conservation strategy in the President's Forest Plan actually increases the amount of carbon dioxide sequestrated by about 7 million metric tons by the year 2000. The careful balance of forest protection and management and the role of old-growth forests is described well in a 1990 *Science* magazine article by Harmon, Ferrell and Franklin. In addition, the President's Forest Plan has strict standards about harvesting which are supported by scientific work by Mr. R. Neil Sampson. Sampson (1997) found that harvesting practices such as clear cutting eliminate canopy shade, increase soil temperatures, accelerate organic decomposition due to soil disturbance, and have other negative impacts on carbon storage in a forested ecosystem. The Forest Plan minimizes clearcuts, protects shade, foliage and canopy closures, minimizes ground disturbance, and avoids whole sale burning of slash, stumps and debris. Last, the President's Forest Plan meets all Federal land management and environmental laws, and your resolution would create a conflict with existing law. While your resolution suggests that national forests should be managed to maximize carbon sequestration, current law requires us to practice multiple use which does not allow one use or management goal to dominate other uses. The U.S. forest sector will store lO9 million metric tons of carbon in 2000. Of this, our National Forests are projected to fix 21 million metric tons of carbon in 2000, store over 8 billion of tons of carbon, conserve biodiversity (and thus flexibility for private land management), and provide for multiple use according to our legal mandates. And although the annual carbon storage in private forests is expected to decline over the next several decades due to declining net growth in Northeastern forests as the trees age and removal of trees in the South at the same rate of their growth, annual carbon accumulation in our National Forests is expected to continue increasing.

Finally, I want to turn to the issue of maximizing growth of new biomass through forest management. The productivity of forestland in the United States varies widely across the country. Productivity is influenced by soil type, soil depth, growing season, rainfall, and other physical factors. Productivity is commonly measured according to the number of cubic feet of wood which one acre of land can grow in one year's time. If Congress was interested in maximizing carbon sequestration through tree growth, it is logical to look for the most productive sites which will grow the most cubic feet per year.

The Forest Service published a document called the *Forest Resources of the United States* (1994) which summarizes forest productivity across different landownerships using a standard of 85 cubic feet/acre/year. In the West, 67 percent of the private industrial lands are capable of producing more than 85 cubic feet per year compared to only 15 percent of the national forest lands in the West. The reason for this is that national forestlands are typically high elevation forests with shorter growing seasons and poorer soils. Similarly in the East, 55 percent of the private industrial land is capable of producing 85 cubic feet or more, and only 20 percent of the national forest land in the East have this level of productivity. The trend is the same, though less dramatic, between nonindustrial private lands and national forest lands in both the East and the West.

Thus, if growing trees quickly is the goal of this resolution, it makes much more sense to focus our efforts in areas where we will receive the greatest return on our investment—the most productive lands—the private lands. The Forest Service can help make this investment not through a change in priorities for public land management, but by providing technical and financial assistance to private landowners to help them increase productivity. The state and private forestry programs of the Forest Service are designed to deliver exactly this kind of assistance to landowners. In addition, the Natural Resource Conservation Service administers a number of programs which help landowners develop and implement plans that promote tree planting. The more efficient and effective place to focus tree planting and aggressive management is on private lands. The President's Climate Change Action Plan in-

cludes two actions that provide technical assistance and cost-sharing for nonindustrial private landowners to plant trees and improve forest management. These programs have resulted in tree planting on 135,000 acres of land.

I want to highlight for a minute your state, Mr. Chairman. The State of Alaska, as well as your neighbors Washington and Oregon, have replanting laws which help continue the benefits of carbon sequestration on private lands in those states. Most states have forest practice laws which contribute to efforts to ensure that landowners practice sustainable forestry. Some states, such as Alabama and Georgia, do not have state forest practices laws, but rely instead on market conditions to encourage tree planting. In these cases, we depend on high lumber prices to promote replanting. In any case, the role of the private landowner, however it is influenced by state or Federal policy, has the opportunity to make a much more significant—and more profitable—contribution to carbon sequestration through active management of productive lands.

There are many other efforts throughout the Forest Service and throughout the Administration which are targeted specifically to address the issue of climate change that are beyond the immediate scope of this resolution and this hearing. In summary, the Administration is enthusiastic about continuing this dialog with Congress about the importance of addressing carbon sequestration and climate change—and the role of the forest sector, but is compelled to strongly oppose the concurrent resolution. I am happy to answer questions that the Committee might have.

STATEMENT OF GORDON ROSS, COMMISSIONER, COOS COUNTY, OREGON

The amount of CO_2 used in photosynthesis per acre of forest land; the amount of oxygen released into the atmosphere; the amount of carbon stored in the forest is in direct proportion to the amount of wood fiber produced.

This is high school biology. I am not an expert witness. This information does not require an expert witness. This knowledge is part of the public domain.

I would like to bring two aspects of forest management to your attention that aid in reducing greenhouse gasses on the globe, both of which compliment each other in addition to having many other societal benefits.

First: Maximizing Forest Growth.

For every soil classification and for each climatic condition there is a growth potential depending on stalking and non-utilizable competition.

I happen to live in the most productive area of North America, the Pacific Northwest or more specifically, the Douglas Fir region. The federally managed portion of this area amounts to just under 25 million acres of which approximately 1/2 is in mature status. According to Roger A. Sedjo in "Forests, a Tool to Moderate Global Warming," approximately one-half of the CO_2 emissions on earth annually are taken up in natural processes present today. Of the 5.8 billion tons of carbon thus emitted, 2.9 billion need to be dealt with if the atmosphere were to remain carbon natural. If the 12.5 million acres of federally managed Douglas Fir forests in the Northwest that are presently mature, could over the next 50 years be harvested and converted to growing forest averaging sequestration of 2 tons of carbon per acre per year, the Northwest's contribution on these lands alone would be 2 5 million tons of carbon or about .8 percent of the needed additional carbon fixation on earth. This would constitute a major commitment on the part of the United States to the Global Community and would have societal benefits including jobs, revenue to local governments and affordable housing nationwide.

On the converse side, if those timber lands are not actively so managed, the contribution of carbon to the global community could be equally as great when history repeats itself. Every acre of Douglas Fir timber prior to planned harvest was a result of a natural regeneration event, mostly fire. If ever we needed to heed the lessons of history, it is now. If we do not harvest, nature will and without any of the societal benefits and at a great threat to public safety.

The second aspect of forest management I wish to give a few minutes to is fire. Wildfire has been touted in recent years as the forester panacea, the answer to all our forest health problems; but fire of catastrophic proportions is the most rapid form of oxidation in the forest. Beyond that point, the timber that is dead continues to rot, a slower form of oxidation. Finally, when the oxidation is complete, the tree has turned to soil and the carbon has united with oxygen and is in the atmosphere. When a forest reaches the point where there is no net increase in wood fiber (when it is oxidizing as rapidly as it is growing there is then no net benefit to the atmosphere). In maximizing wood fiber production we not only maximize the benefit to our atmosphere but we also produce societal benefits such as homes, jobs and government services. Further, in Western Oregon our managed forests are also produc-

ing better aquatic resources. Coos County annually harvests more timber than any county on the Pacific Coast and it has more Coho Salmon than any county on the Pacific Coast. In fact, it has more Coho than all the rest of the Oregon counties put together.

When my forebears came to Western Oregon in the early 1850's they found even aged stands of Douglas Fir in varying ages of growth depending on how long it had been since the last fire. What is now the Siuslaw National Forest was ashes. They saw the fire of 1868 jump the South Fork of Coos River and burn over 1/3 of Coos County. This was a function of nature, a recycling of carbon but at a time before we began using fossil fuels. Today, when the average American uses 7 gallons of petroleum per day to transport themselves, their supplies and services, there is no dispute but that there is adequate carbon in the atmosphere for our crops and forests to meet their maximum growth potential. The forest effected by the N.W. Forest Plan have the potential of growing 5 billion board feet of timber per year.

If we only harvest 10 percent of that potential as under the Northwest Forest Plan, eventually the forests will only be growing at that rate. However, speaking historically, we can say with assured certainty, if we do not harvest at a rate closely approaching growth potential, nature will, through catastrophic fire.

In the Northwest, as we see our mills and logging operations shutting down, as we see timber being imported, further tilting our balance of trade; as we witness the loss of jobs, loss of county revenue for public health and safety we are also witnessing the loss of the largest fire department ever assembled in the history of the world. The loggers and their bulldozers and lowboys and water wagons and fire fighting equipment and manpower and just plain know how. As fuel buildup continues, our ability to deal with it decreases.

Because Coos County is in the general proximity of the best tree growing area in North America, and because we maximize that growth by optimizing our harvest cycle, it is encouraging to know that Coos County has done more to enhance the atmosphere in the past century than probably any other county of its size in America.

We, from Coos County, Oregon, would like to challenge the rest of America, through legislative commitment to do as well.

Thank you.

105TH CONGRESS
1ST SESSION

H. CON. RES. 151

Expressing the sense of the Congress that the United States should manage its public domain national forests to maximize the reduction of carbon dioxide in the atmosphere among many other objectives and that the United States should serve as an example and as a world leader in actively managing its public domain national forests in a manner that substantially reduces the amount of carbon dioxide added to the atmosphere.

IN THE HOUSE OF REPRESENTATIVES

SEPTEMBER 10, 1997

Mr. YOUNG of Alaska (for himself, Mr. GINGRICH, Mrs. CHENOWETH, Mr. TAYLOR of North Carolina, Mr. HERGER, Mr. PETERSON of Pennsylvania, Mr. POMBO, Mr. MCINNIS, Mr. SESSIONS, Mrs. LINDA SMITH of Washington, Mr. RIGGS, Mr. CUNNINGHAM, Mrs. CUBIN, Mr. NETHERCUTT, Mr. DOOLITTLE, Mr. LEWIS of California, Mr. SKEEN, Mr. BOB SCHAFFER of Colorado, Mr. HANSEN, and Mr. RADANOVICH) submitted the following concurrent resolution; which was referred to the Committee on Resources

---

CONCURRENT RESOLUTION

Expressing the sense of the Congress that the United States should manage its public domain national forests to maximize the reduction of carbon dioxide in the atmosphere among many other objectives and that the United States should serve as an example and as a world leader in actively managing its public domain national forests in a manner that substantially reduces the amount of carbon dioxide added to the atmosphere.

Whereas carbon dioxide, a major greenhouse gas, can be removed from the atmosphere by trees through photosynthesis and stored in wood;

Whereas the release of that stored carbon dioxide, through the decomposing or burning of wood, can be prevented or delayed by the harvesting of forest products and their use in environmentally friendly wood products such as furniture, building materials for homes and paper;

Whereas other releases of carbon dioxide can be prevented by the use of wood products as substitutes for products whose manufacture consumes fossil fuels and releases substantial amounts of carbon dioxide; and

Whereas actively managing our public domain national forests by planting, growing and utilizing our forest resources will remove carbon dioxide from the atmosphere: Now, therefore, be it

Resolved by the House of Representatives (the Senate concurring), That it is the sense of the Congress that the United States—

(1) should manage its public domain national forests to maximize the reduction of carbon dioxide in the atmosphere and recognize the scientific validity of carbon sequestration and sinks of trees and wood products; and

(2) should serve as an example and as a world leader in actively managing its public domain national forests in a manner that substantially reduces

the amount of carbon dioxide added to the atmosphere.

○

FOREST AND WOOD PRODUCTS ROLE IN CARBON SEQUESTRATION[1]

R. Neil Sampson[2]

The Forest Resources of the United States

There are 737 million acres of forested lands in the United States, of which about 2/3 is defined as timberland, that is, land capable of growing 20 ft³ of merchantable wood per acre per year, and not reserved for other uses (Powell et al. 1993). The area of forest land has remained relatively stable since 1950 (Table 1), but the area of timberland has diminished about 19 million acres since 1952 with additions to wilderness and park areas, as well as urban development and fragmentation (Table 2).

Table 1. Major uses of land in the United States at selected years.

Land use	1950	1969	1987
	Million acres		
Cropland	409	384	464
Pasture and	701	692	591
Forest	721	723	731
Other	442	465	479
Total Land Area	2,273	2,264	2,265

Source: Frey and Hexom, 1982; Daugherty, 1989.

Table 2. Trends in Timberland in the United States at selected years

	1952	1977	1992
	Million acres		
National Forest	95	89	85
Other Public	51	49	47
Industrial	59	69	70
Non-industrial	304	285	288
Total Timberland	509	492	490

Source: Powell et al. 1993.

The woody materials in forests are about half carbon on a dry weight basis (Birdsey 1996a). In total the organic carbon stored in the vegetation; litter, humus, and woody debris; and soils of U.S. forests amounts to 60 billion tons (Birdsey and Heath 1995). This stored carbon amounts to about 40 times the Nation's annual carbon emissions of around 1.5 billion tons (Marland et al. 1994). The largest part of the stored carbon, some 61 percent, is found in the forest soils. About 29 percent of the stored carbon is in the trees, and the remaining 10 percent is in the woody litter, debris, and humus on the forest floor as well as the understory vegetation.

The Current Role of Forests & Forest Products in Mitigating C Emissions

---

[1] Presented at The International Climate Change Conference & Technologies Exhibition, June 13, 1997, Baltimore, Maryland.

[2] President, The Sampson Group, Inc. and Senior Fellow, American Forests, Washington, DC.

Regional Differences

There are major differences in the amount of carbon stored in the forested regions of the country. Some 25 billion tons, 41 percent of the total, is stored in the forest ecosystems of the Pacific Coast, mostly in Alaska. About 25 percent is stored in the forests in the North, 14 percent in the Rocky Mountains, and 21 percent in the South (Hair et al. 1996). These regional differences reflect differences in climate and in the age and density of the forests. The cool climates of the Pacific Coast and North slow the oxidation of carbon in the soils, in dead trees, and in the woody materials on the forest floor. The Pacific Coast region has big areas of old, undisturbed forests that contain large volumes of carbon.

Carbon storage in forests is constantly changing in response to land clearing; tree planting on lands that have been used for crops and pastures; timber harvesting; and the natural regeneration, growth, and death of vegetation. In recent decades, carbon storage has been rising because timber growth has been higher than the total of harvest removals and mortality, with a consequent increase in timber inventories. Between 1952 and 1992, for example, carbon storage on forest lands in the conterminous United States increased by 12.4 billion tons—about 25 percent (Birdsey and Heath 1995).

Timber growth is substantially above removals in the hardwood forests, and carbon is accumulating in the major hardwood regions. The largest increase is in the Northeast, but there are also big increases in storage in the Southeast and on the Pacific Coast. In some areas in the South Central region, removals are above or close to growth, and the carbon accumulation is quite small.

Mortality increased by 24% between 1986 and 1991 in all regions, on all ownerships, for both hardwoods and softwoods (Powell et al. 1993). Obviously, the continued increase of carbon storage in U.S. forests is not assured if increasing mortality rates are experienced in the future.

Managing Carbon Balances in Forests

Carbon accumulates within a forest over time, as the forest changes due to tree growth and ecological succession. Over many years, the Forest Service has measured the growth of different tree species and forest types on different soil types. These growth and yield models have now been converted to carbon accumulation models (Birdsey 1996b).

Two examples illustrate the use of these tables. In loblolly pine plantations of the South, there are two significantly different growth yields. One is the estimate of managed yields — the yields that good managers consistently achieve. The second is the inventory yield — the yield that is realized over the average of all ownerships and managers. The difference, which can be as much as 60% over an 80-year rotation, is important. For individual projects on good sites, where management is assured, the high estimate of carbon sequestration is reasonable. For national policy, where we ask what the general achievement will be, the lower estimate is most reasonable (Hair et al. 1996).

Another example might be the old growth Douglas-fir stands of the Pacific Northwest. These forests have enormous stores of carbon on site, and while the accumulation is slow because of the maturity of the trees, it continues to occur. If our goal is to retain stored carbon for the next few decades, we protect these forests. Harvesting them, and removing all the dead wood from the site without using it to offset fossil carbon, would result in a net loss of carbon that would take decades to recover. If our object is to increase carbon storage over time, however, then harvest and replanting becomes the best option (Row 1996).

The reason for this somewhat counter-intuitive conclusion is found in the research that has tracked the fate of forest carbon following harvest. This has demonstrated that a significant amount of the carbon remains in terrestrial storage, often as products in use or in material that is

retained in landfills or dumps (Row and Phelps 1996). Another significant percentage is utilized to replace fossil fuels as an energy sources. As long as this comes from forests that are managed sustainably, it represents a short-term recycling of carbon in and out of the atmosphere, replacing an emission from the stored fossil sources, so it is a net replacement in terms of carbon emissions (Hair et al. 1996).

The effect is that, if we study the effect of long-term forest management schemes on carbon balances, the managed forest, with products utilized for long-term storage, continues to build terrestrial carbon storage rotation after rotation, as the amount of products continue to reside for significant periods of time in storage. This can be illustrated by looking at the probable effects of different management schemes on several different forest types (Row 1996).

Potential for Increasing Carbon Storage in United States Forests

Converting marginal crop and pasture land

An estimated 116 million acres of land that was biologically suited to growing trees was being used as marginal crop and pasture land in 1982. (Parks et al. 1992). About half was in cropland and half in pasture at the time, and it was equally nearly divided in terms of its suitability for softwood and hardwood forests (Parks et al. 1992). The total opportunity it offered was between 1.5 and 5.2 billion cubic feet of wood a year, which would have been somewhere in the range of 36 and 131 million tons of carbon added to the forest inventory (Hair et al. 1996). Some of that opportunity—4 to 5 million acres—has been captured by tree planting under the Conservation Reserve Program since 1985, but there are over 100 million acres still available for trees if the appropriate incentive to landowners can be created.

Increasing timberland growth

Even larger opportunities exist in increasing timber growth and inventories on timberland (Vasievich and Alig 1996). These opportunities exist on over 200 million acres, and could add up to somewhere between 152 and 210 million tons of carbon storage per year (Hair et al. 1996). Changes in storage that would result over time from implementing these opportunities will depend on the timber growth or yields that could be expected in the future. These will vary with geographic location, species or forest type, management practices, and climate change.

It is clear that there are very large opportunities to increase carbon storage on marginal crop and pasture lands and on timberlands. But in time, if trees are left alone, carbon storage will tend to stabilize as sites and species reach the stage where trees begin to die and decay or when they are burned in fires. However, if the trees are harvested sustainably and converted into products or used for fuel, storage can be increased through many forest rotations.

Reducing wildfire losses

That illustrates the quandry faced in many areas as forests without active management begin to reach conditions where destructive wildfires are virtually assured. In the western United States, a large area of forests that were historically disturbed by frequent, low-intensity wildfire have been without fire's effect for a century or more (Covington et al. 1994). The result, as biomass levels have built up, are forests that are so heavily laden with flammable fuels that today's wildfires are larger and hotter than those of the past. Table 3 illustrates the average annual wildfire experienced in the 11 western United States in recent decades. The annual averages shown are the average of the 10 years in each decade, which helps reduce the variability experienced from year to year because of annual weather conditions.

Table 3. Average annual wildfire, 11 Western United States, by decade.

Years	1940-49	1950-59	1960-69	1970-79	1980-89	1990-96
Average acres burned per year	825,348	476,920	463,871	765,948	1,553,142	1,872,353

Source: USDA Forest Service (1940-1990); National Interagency Fire Center (1990-96)

These wildfires are increasingly costly, both in terms of suppression costs and resource damage. In the ten years 1985-1994, the Forest Service reported expenditures of over $4 billion in fire suppression costs, not including the costs incurred by other federal, state and local agencies, nor the amount spent on post-fire watershed or forest restoration. Much of the suppression money was spent protecting homes and other structures adjacent to wildland areas. In 1994, $250-300 million was spent in urban-wildland areas (USDA/USDI 1995).

Wildfires emit enormous amounts of C, but estimates are difficult to derive because fuel consumption estimates for wildfires are seldom available. In one assessment of two large (120,000 acres) 1994 wildfires in the Boise National Forest, Neuenschwander and Sampson (in press) estimated that the average fuel consumption was 47.2 tons per acre, equivalent to 21.4 tons of carbon per acre. These fires, which burned at mixed intensities in ponderosa pine forests, consumed more fuel than average for western wildfires, many of which burn in grass and brush fuels. Average wildfire emissions are on the order of 10 tons C per acre burned (Sampson, in press). That puts the average emission impact in the range of 15-20 million tons C per year from the western wildfires. This is somewhat higher than the estimates used in recent climate modeling exercises, perhaps because wildfires have increased over the last few decades, and the models were based on historical averages (USEPA 1993). Auclair and Carter (1993) noted a correlation between the recent wildfire increases and recent atmospheric CO_2 levels.

The challenge for forest managers is to reduce available fuels in the most dangerous situations, and introduce managed fire under cooler conditions that restore ecosystem conditions without destructive effects (USDI/USDA 1995; Covington et al. 1997). That is a formidable task, due to the large areas involved and the lack of markets for the smaller material that needs to be removed from many sites. Research in an Arizona ponderosa pine forest found, for example, that 37 tons of thinning slash and 21 tons of surface duff per acre needed to be removed prior to a restoration burn (Covington et al. 1997). A biomass market for this material, so that it could be burned cleanly for energy production, would be welcomed by forest managers, but is currently not competitive with natural gas generation (Sampson, in press). Between the estimated 47 tons of biomass burned per acre in the recent Boise National Forest fires (above) and the 58 tons of excess that Covington found, it appears that the surplus biomass in overcrowded ponderosa pine forests, were it to be made available for energy production, could be in the range of 50 tons per acre over 20 million acres. (There are around 29 million acres of ponderosa pine forests in the west; most are in dense structures that need thinning (Oliver et al. 1997)). That's roughly 1 billion tons of biomass, and while it took 100 years or so to accumulate on these sites, there is no assurance that it will remain in its current unstable condition for much longer without burning in an unwanted wildfire. One estimate suggests that only 10-15 years remain before most of it burns (Covington et al. 1994). Removing this biomass through planned thinnings, and burning it for energy within the next decade, would require the burning of 100 million tons of biomass a year from the ponderosa pine forests alone. Other western forests, primarily mixed conifer and lodgepole pine types, would add to that total. The treatment of ponderosa pine alone would result in an average offset in the range of 50 million tons C emissions per year, which could be proposed as a high estimate of the opportunity. The low estimate is zero, because of the current lack of an

opportunity for biomass generation near the affected forests.

Changing timber harvest methods

A related opportunity exists through changing timber harvest methods. Timber harvest is, except for intense wildfire, the most disruptive event in the forest life cycle. Attention to the effects of forest harvest methods on carbon sinks will lead to methods that:

* Leave enough canopy cover to shade the soil and keep soil temperatures reduced;
* Leave foliage and small branches on-site to minimize nutrient export;
* Burn slash carefully, and leave adequate snags and large woody debris as a carbon legacy for the ecosystem; and,
* Minimize soil disturbance and movement, through mechanical activities or erosion, to prevent export of soil carbon or accelerated organic decomposition due to aeration (Sampson, 1995).

The practice of clearcut harvesting attracted negative public reaction to its appearance and effect on the forest, and foresters failed to convince the public that it is a necessary and useful practice. In 1992, the Forest Service declared a new policy to minimize the use of clearcutting as a harvest method wherever other methods are available (Robertson, 1992). The Sustainable Forestry Initiative encourages industrial foresters to voluntarily limit the size of clear-cut (some states also have enacted size limits). Reports by participating members of the American Forest and Paper Association indicate that the average size of industry clear-cut was 61 acres in 1996, down from 66 acres in 1995 (AF&PA 1997).

This should be a positive change in terms of carbon sinks and the effects of forest harvest upon them. Particularly in its most extreme forms, where the slash, stumps, and debris were piled and burned, the volatilization of carbon, both in the debris and the soil, was maximized. Although little evidence of site deterioration has been found, it seems inconceivable that interrupting the normal cycles in such an aggressive fashion would go without impact (Sampson 1995).

Potential for Using Forest Products to Reduce or Offset Carbon Emissions

Post-harvest carbon flows

The fate of carbon as it flows from forest through processing, end use and final disposition back to the atmosphere is an important aspect of the carbon question. A computer model called HARVCARB produces an estimate of the various routes and fates of harvested carbon through the current U.S. economy (Row and Phelps, 1996). This model allows a test of the implications of different forest management strategies, changes in wood-using technology, and differences in disposal methods.

In tracing the flow of carbon that results from a timber harvest, it is important to recognize that, in addition to the major products involved such as lumber, plywood and paper, there is a constant stream of by-products that can be burned, with or without energy recovery, or simply left to decompose on the land or in landfills. In evaluating how effective the trees and forests that we plant or manage today will be in altering the global carbon balance in the future, we must make some assumptions about the fate of those trees and forests, and the use of the biomass produced. The more biomass that is constructively utilized, in long-lived products or to replace fossil fuel energy, the more effective the forests will be as a carbon sink.

Using a southern pine stand as a test case, Row and Phelps (1992) demonstrated that there are significant differences in carbon flows depending upon the management regime chosen for the forest. The differences were created mainly by the fact that longer-rotation trees are utilized in different product mixes (more solid wood products) than when the trees are harvested at a

younger age.

Wood products and environmental impact

There has been considerable debate and positioning between industrial sectors over the most "environmentally-friendly" ways to meet our need for industrial products. Increasingly, consumers indicate preference for "green" products, even at somewhat higher costs (NEETF 1996)

In the main market for wood products — building materials — the competition comes largely from the steel and masonry industries. The steel industry has developed framing materials that compete well in price and performance for use in homes and other building applications, and that out-compete wood when timber prices rise. Its claim to being a "green" product lies in its high degree of recycling. Concrete and brick make much of their local abundance in many areas, and long life in use. Wood counters with its claim of renewability (Meil 1994).

The question of total environmental effect is a complex one, and several parameters need to be considered. One of the measures relevant to the climate policy debate is total energy expended in the life cycle of the product. This estimates the relative amount of energy involved in extracting the basic material, processing or manufacturing the product, fabricating the building, occupying it, and disposing or recycling the material at the end of its useful life (Meil 1997).

Table 4.—Estimated emissions from alternative building materials used to frame new residential construction in the U.S., based on 1995 construction estimates.

Framing Option	CO_2 Emissions	C Emissions
	(Million tons)	
All-wood framing	1,488,534	405,964
95% wood; 5% steel	1,686,759	460,025
75% wood; 25% steel	2,479,661	676,271
All-steel framing	5,453,042	1,487,193

On this measure, wood competes well. An interior wall constructed with steel studs is 3 times more energy intensive than its wood counterpart, meaning that the CO_2 emissions are also 3 times as great (Meil 1994). If the analysis is extended to an exterior, load-bearing wall, the wood advantage increases to something on a 1:4 energy and CO_2 ratio with steel, even where 50% recycled steel is assumed, because of the thicker steel needed for structural strength (Meil 1994). On another environmental parameter — water consumption — steel assembly requires some 25 times more water than its wood counterpart (Meil 1994). This increases the polluting effluents associated with industrial water use, so if either water shortages or pollution control costs are a locally-important environmental issue, this is a factor to consider.

While the relative environmental advantages of wood over steel seem significant, the total annual climate impacts are modest by comparison with many of the other forestry-related opportunities to affect CO_2 emissions. The life-cycle model results reported by Meil (1994) indicate that, for an interior wall, wood construction results in about 0.35 tons of CO_2 emissions per 1,000 ft^2 of wall while steel results in about 1.07 tons. Comparable estimates for exterior

walls are 0.44 tons CO_2 per 1,000 ft^2 for wood and 1.76 tons for steel. In 1995, U.S. housing starts were around 972,000, with the average house utilizing around 4,260 board feet of framing lumber to construct an average of around 1,600 ft^2 of interior walls and 2,170 ft^2 of exterior walls (NAHB 1996). These estimates can be used to test the potential CO_2 effect of the steel industry's goal of achieving 25% of the U.S. market for framing materials in housing construction (Meil 1994). Table 4 indicates the impact of options for using wood and steel. The difference between all-wood and all-steel—about 1 million tons C per year in terms of CO_2 emissions— is only a partial measure of the climate impact of the two competitors, because it does not account for the wood wall's value in storing C for many years, which would increase the wood's advantage.

There would appear to be a significant opportunity to increase carbon storage, as well as achieve other environmental goals, by using wood more effectively. This would include substituting wood for more environmentally-damaging products, recycling wood and paper products extensively, and improving the efficiency of wood use in buildings and other products. Research by the USDA Forest Service indicates that the average annual impact of increased recycling of paper and wood products could result in from 8 to 44 million tons of additional carbon stored in forests each year (Skog et al. 1996).

A major question to be answered by those proposing to "save forests" by substituting other products for wood in the name of environmental impact is "what will we do with all that wood?" Forests are valued for many things besides wood products, and many forest lands are managed with timber as a secondary product, or with no timber harvest at all. That does not stop the forest from growing a surplus of biomass on most sites that, if not harvested and used, needs to be recycled somehow. It cannot build up endlessly on the site and, if it builds up over threshold levels for a particular site, the system can become unstable and subject to extreme disturbances such as uncharacteristically hot or large wildfires (Binkley et al. In press). If the answer, in the name of environmental protection, is "let it burn," which is sometimes heard, the implications for destructive ecosystem impacts, watershed deterioration, and human health (air quality) effects need to be considered (Sampson et al. In press).

The total potential for growing wood in the United States, on both existing forests and marginal lands that could grow forests, is in the range of 35 billion ft^3 per year (up from an estimated 22 billion today (Hair et al. 1996). The latest Forest Service projection of demand is about 24 billion ft^3 in industrial products, indicating that if forests were producing to their potential, we would have some 11 billion ft^3 added to the inventory each year unless it were harvested and burned as fuel (Hair et al. 1996). The reality of the situation is that there are environmental tradeoffs to be made with every aspect of forest management and product use, and a careful accounting of the net effect often comes out to favor the sustainable use of forests for wood products.

Biomass energy crops

Substituting woody biomass for fossil fuels results in a net reduction of fossil fuel burning and, consequently, a net reduction in the amount of net CO_2 added to the atmosphere. Planting woody crops that grow rapidly, are harvested on a 4-12 year cycle, and re-sprout after cutting, can meet energy needs, reduce fossil fuel use, and build new income-producing options for farmers (Wright and Hughes, 1993). Because of intensive management such as maintenance of high fertility rates, irrigation, and weed control, the technology is more related to agriculture than to forestry.

Land availability for short-rotation woody crop (SRWC) production is more a function of economic opportunity and technological development than of biological capacity. Of the 422 million acres of U.S. cropland, about 307 million have the combination of fertility, rainfall, and

slope to be suitable for SRWC (Wright et al. 1992). In addition, over 85 million acres of pasture and forest land are estimated to have good to moderate potential for conversion to cropland. Most of the suitable lands are in the North Central states. Of these lands, about 225 million acres have the capability to yield 5 or more tons of standing dry biomass per acre per year under current technology (Wright and Hughes, 1993).

Increasing the Use of Energy-Conserving Trees

In urban situations, properly placed urban trees can have a significant impact on atmospheric carbon buildup through energy conservation. Studies in the U.S. indicate that the daily electrical usage for air-conditioning could be reduced by 10-50% by properly located trees and shrubs (USEPA, 1992). Savings of 1,351-1,665 kWh per year for a 137 m^2 house have been recorded (McPherson and Woodward, 1990). On the other side of the calendar for energy conservation, properly placed trees can also reduce winter heating costs by 4 to 22 percent (De Walle, 1978).

Sampson et al. (1992) have proposed a goal for a 10-year program aimed at increasing the canopy cover by 10% on residential lands, and 5-20% on other urban lands in the U.S. They estimate that the effect of such an improvement program on U.S. urban forests could result in sequestration of 3 to 9 million tons of C per year in trees and soils, and an added 7 to 29 million ton reduction in C emissions due to energy conservation from improved shading, increased evapotranspiration, and reduction of the urban heat island, along with wintertime heat savings. Methods of achieving these reductions have been well developed (USEPA 1992). Windbreaks and shelterbelts add another 3 to 7 million ton potential (Brandle et al 1992).

Adding up the Forest-Related Opportunities in the United States

In total, the opportunities to increase carbon storage and reduce carbon emissions could offset somewhere between 20 and 40 percent of the carbon being emitted annually into the atmosphere in the United States (Table 5). The broad range in these estimates is a measure of the uncertainties with these calculations, which are based on many data sources of variable quality and on relationships between tree and forest growth and carbon impacts that have had only limited scientific study. In one sense, the estimates are conservative, because they are based on current technology. On the other side of the ledger, they are also based on a continuation of recent climatic trends.

Table 5. Forest Opportunities to Increase Carbon Sequestration or Reduce Carbon Emissions in the United States.

Type of Opportunity	Low Estimate	High Estimate
	Million tons C per year	
Converting marginal crop and pasture land to trees	36	131
Improving growth and yield of timberlands	152	210
Reducing wildfire losses*	5	15
Substituting wood for steel in housing construction (Emissions reduction effect only)	0	1
Biomass energy from surplus forest biomass	0	50
Biomass energy from woody crops	100	199

Energy-saving trees around homes and communities	13	45
Increased wood substitution, efficient buildings, recycling*	8	44
Total annual impact on C emissions	314	695
Total impact as a percentage of annual C emissions (1.5 billion tons/year)**	21%	46%

* This is an estimated savings in addition to the biomass energy estimated below.
** These percentages are slightly higher than reported in Hair et al. (1996) due to the addition of quantitative estimates for wildfire, excess biomass in western forests, substitution, and recycling.

Despite the uncertainties, there are major opportunities to use forests, trees, and wood to mitigate carbon emissions and to ameliorate adverse effects that might come from global warming. With the necessary investments, trees and forests can make substantial contributions in any comprehensive program to mitigate climate changes resulting from the buildup of carbon dioxide in the atmosphere.

Uncertainties Facing Forest Managers

Adapting forests to an uncertain climate

The calculations above are based on the assumption that climate conditions for forest growth and management will remain roughly the same in the future as in the recent past. Whether that is a sound assumption or not is open to considerable conjecture, but lacking any reliable data upon which to provide an estimate of future climate trends, it seems logical to use it.

What we realize, however, is that changing climate may impose significant new challenges for forest managers, particularly if it changes faster than the average life span of planted trees or the migration rate of natural forest species (Sommers 1996).

If, as some evidence indicates, unstable climate regimes also result in an increase of extreme climate events such as droughts, floods, or hurricanes, that also spells difficulty for forest managers. Forests that are affected by large-area disturbances such as these put large and unplanned "lumps" of wood on the market in the affected regions, stretching industrial capacity and resulting in additional waste in some instances.

Resource managers, both public and private, will be tested with new challenges if climate events or trends begin to adversely affect forests. The net effect of increased mortality will be to move many forest regions toward younger stands and earlier-successional forests. Whether managers can adapt to these changes, particularly in remote areas, remains a major question.

Overcoming Political and Economic Barriers

The barriers against implementing all or most of the foregoing opportunities include a major need for increased investment in forest management. One estimate suggests the need for an additional $10.9 billion invested in timberland opportunities alone, mostly on the private forest lands of the South (Hair et al. 1996). Investments of this type will only be made when investors believe the policy climate is favorable and stable for the investment future of 1-3 decades. This means that technical and financial incentive programs, and tax treatment, as the two most visible policy instruments, must appear to be favorable. The fact that there are massive opportunities in today's situation, in spite of the fact that many of them would pay an economic return of 4 percent

or more above inflation, suggests that landowners either aren't aware of the opportunities, or don't believe them to be attractive enough.

On public lands, the increasing opposition to intensive forest management and its impact on other forest values signals a less-active timber program in the future. The challenge on many of these forests, particularly those that are fire-adapted, will be to manage biomass so as to minimize the ecological, economic, and public health damage from the fires that will recycle the biomass if it is not intentionally removed and either used for wood and paper products, or burned for energy. The challenge of having fairly large populations, sprawling urban-wildland intermixes, and greatly increased smoke emissions from fires is not one that will be easily resolved, but it is the reality facing much of America today.

References Cited

AF&PA. 1997. *Sustainable Forestry for Tomorrow's World: 1st Annual Progress Report on the American Forest & Paper Association's Sustainable Forestry Initiative.* Washington, DC: AF&PA. 28 pp.

Auclair, Allan N.D. and T.B. Carter. 1993. Forest wildfires as a recent source of CO_2 at northern latitudes. *Canadian Journal of Forest Research.* 23: 1528-1536.

Binkley, C.S., M.J. Apps, R.K. Dixon, P.E. Kauppi and L-O Nilsson. 1995. Sequestering Carbon in Natural Forests. In Sampson, R. Neil, Roger A. Sedjo and Joe Wisniewski (eds), *Economics of Carbon Sequestration in Forestry.* Working papers from a workshop held in Bergendal, Sweden, 15-19 May, 1995. Washington, DC: American Forests. 47-64.

Birdsey, Richard A. 1996a. Carbon Storage for Major Forest Types and Regions in the Conterminous United States. In Sampson, R. Neil and Dwight Hair (eds), *Forests and Global Change, Volume 2: Forest Management Opportunities for Mitigating Carbon Emissions.* Washington, DC: American Forests. 1-26.

Birdsey, Richard A. 1996b. Regional Estimates of Timber Volume and Forest Carbon for Fully Stocked Timberland, Average Management After Final Clearcut Harvest (Appendix 2) and Regional Estimates of Timber Volume and Forest Carbon for Fully Stocked Timberland, Average Management after Cropland or Pasture Reversion to Forest (Appendix 3) and Regional Estimates of Timber volume and Forest Carbon for Managed Timberland (Appendix 4). In Sampson, R. Neil and Dwight Hair (eds), *Forests and Global Change, Volume 2: Forest Management Opportunities for Mitigating Carbon Emissions.* Washington, DC: American Forests. 261-371.

Birdsey, Richard A. and Linda S. Heath. 1995. Productivity of America's forests and climate change. Gen. Tech. Rep. RM-271 Ft. Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 56-70.

Brandle, James R., Thomas D. Wardle and Gerald F. Bratton. 1992. Increasing Tree Planting in Shelterbelts. In Sampson, R. Neil and Dwight Hair (eds), *Forests and Global Change, Volume 1: Opportunities for Increasing Forest Cover.* Washington, DC: American Forests. 157-176.

Covington, W. Wallace, Peter Z. Fulé, Margaret M. Moore, Stephen C. Hart, Thomas E. Kolb, Joy N. Mast, Stephen S. Sackett, and Michael R. Wagner. 1997. Restoring ecosystem health in ponderosa pine forests of the Southwest. *Journal of Forestry* 95(4):23-29.

Covington, W.W., Everett, R.L., Steele, R., Irwin, L.L., Daer, T.A. and Auclair, A.N.D. 1994. Historical and anticipated changes in forest ecosystems of the Inland West of the United States. *Journal of Sustainable Forestry,* Vol. 2, Nos. 1/2, pp. 13-64.

Daugherty, Arthur B. 1991. *Major Uses of Land in the United States: 1987.* Agricultural Economic Report Number 643. Washington: US Department of Agriculture, Economic Research Service. 35 pp.

DeWalle, D. R. 1978. Manipulating urban vegetation for residential energy conservation. In: *Proceedings of the 1st national urban forestry conference*; November 13–16, 1978; Washington, DC. Washington, DC: USDA Forest Service: 267-283.

Frey, H. Thomas and Roger W. Hexem. 1982. *Major Uses of Land in the United States.* AER-535. Washington: USGPO 30 pp.

Hair, Dwight, R. Neil Sampson and Thomas E. Hamilton. 1996. Summary: Forest Management Opportunities for Increasing Carbon Storage. in Sampson, R. Neil and Dwight Hair (eds), *Forests and Global Change, Volume 2: Forest Management Opportunities for Mitigating Carbon Emissions.* Washington, DC: American Forests. 237-254.

Marland, G., R.J. Andres, and T.A. Boden. 1994. Global, regional, and national CO_2 emissions. pp. 505-584 in T.A. Boden, D.P. Kaiser, R.J. Sepanski, and F.W. Stoss (eds.), Trends '93: A Compendium of Data on Global Change. ORNL/CDIAC-65. Carbon Dioxide Information Center, Oak Ridge National Laboratory, Oak Ridge, TN.

McPherson, E. Gregory and Gary C. Woodward. 1990. Cooling the urban heat island with water- and energy-efficient landscapes. *Arizona Review* Spring 1990: 1–8.

Meil, J. K. 1994. Environmental measures as substitution criteria for wood and nonwood building products. Proceedings: Supply, Processes, Products, and Markets—A Conference sponsored by the Forest Products Society and the Oregon Forest Resources Institute. November 1-2, 1993, Portland, OR (Forest Products Society Proc. #7319).

NAHB Research Center, Inc. 1996. *Wood Used in New Residential Construction: 1995.* Upper, Marlboro, MD: NAHB Research Center, Inc.

National Interagency Fire Center (Current). NIFC maintains a current report of fire activity across the United States. It can be accessed on the World Wide Web at <http://www.nifc.gov>. Wildfire area records for 1990-1996 provided through this data base, formerly maintained at NIFC by the U.S. Fish and Wildlife Service.

NEETF. 1996. *Report Card: Environmental Attitudes and Knowledge in America — The Fifth Annual Survey of Adult Americans.* Washington, DC: National Environmental Education and Training Foundation. 61 pp.

Neuenschwander, Leon F. and R. Neil Sampson (in press). A Wildfire and Emissions Policy Model for the Boise National Forest. *Journal of Sustainable Forestry* (forthcoming).

Oliver, Chad, David Adams, Thomas Bonnicksen, Jim Bowyer, Fred Cubbage, Neil Sampson, Scott Schlarbaum, Ross Whaley, Harry Wiant, and John Sebelius. 1997. *Report on Forest Health of the United States by the Forest Health Panel.* Reprinted by CINTRAFOR, RE43A. Seattle: University of Washington.

Parks, Peter J. Susan R. Brame, and James F. Mitchell. 1992. In Sampson, R. Neil and Dwight Hair (eds), *Forests and Global Change, Volume 1: Opportunities for Increasing Forest Cover.* Washington, DC: American Forests. 97-122.

Powell, Douglas S., Joanne L. Faulkner, David R. Darr, Zhiliang Zhu, and Douglas W. MacCleery. 1993. Forest Resources of the United States, 1992. General Technical Report RM-234. Fort Collins, CO: USDA Forest Service, Rocky Mountain Forest and Range Experiment Station 132 p. + map.

Robertson, F. Dale. 1992. Ecosystem Management of the National Forests and Grasslands: Letter to Regional Foresters and Station Directors, June 4, 1992. USDA Forest Service. 6 p.

Row, Clark. 1996. Effects of Selected Forest Management Options on Carbon Storage. In Sampson, R. Neil and Dwight Hair (eds). *Forests and Global Change, Volume 2: Forest Management Opportunities for Mitigating Carbon Emissions.* Washington, DC: American Forests. 59-90.

Row, Clark, and Robert B. Phelps. 1996. Wood Carbon Flows and Storage after Timber Harvest. In Sampson, R. Neil and Dwight Hair (eds), *Forests and Global Change, Volume 2: Forest Management Opportunities for Mitigating Carbon Emissions.* Washington, DC: American Forests. 27-58.

Sampson, R. Neil (in press). *Potential Effects on Greenhouse Gas Emissions from Forest Management Options to Affect Wildfire Risk in the 11 Western States.* Washington, DC: American Forests (forthcoming).

Sampson, R.N. 1995. The Role of Forest Management in Affecting Soil Carbon: Policy Considerations, in Lal, R., John Kimble, Elissa Levine, and B.A. Stewart (eds.) *Soil Management and Greenhouse Effect.* Boa Raton, FL: CRC Lewis Publishers. 339-350.

Sampson, R. Neil, Gary A. Moll, and J. James Kielbaso. 1992. Opportunities to Increase Urban Forests and the Potential Impacts on Carbon Storage and Conservation, in: Sampson, R. Neil and Dwight Hair (eds), *Forests and Global Change, Volume 1: Opportunities for Increasing Forest Cover,* Washington DC: American Forests, pp. 51-72

Skog, Kenneth E., Thomas C. Marcin, and Linda S. Heath. 1996. Opportunities to Reduce Carbon Emissions and Increase Storage by Wood Substitution, Recycling and Improved Utilization. In Sampson, R. Neil and Dwight Hair (eds). *Forests and Global Change, Volume 2: Forest Management Opportunities for Mitigating Carbon Emissions.* Washington, DC: American Forests. 209-216.

Sommers, William T. 1996. Opportunities to Respond to the Effects of Global Warming on Forests. In Sampson, R. Neil and Dwight Hair (eds). *Forests and Global Change, Volume 2: Forest Management Opportunities for Mitigating Carbon Emissions.* Washington, DC: American Forests. 189-198.

USDA Forest Service. 1992. 1984-1990 wildfire statistics. Washington, DC: USDA Forest Service, State and Private Forestry, Fire and Aviation Management Staff.

USDA/USDI. 1996. *Status of the Interior Columbia Basin: Summary of Scientific Findings.* Portland, OR: USDA Forest Service, Pacific Northwest Research Station. 144 pp.

USDI/USDA. 1995. *Federal Wildland Fire Management: Policy & Program Review*. Washington. DC: U.S. Department of the Interior & USDA Forest Service. 45 pp.

USEPA. 1993. *The forest sector carbon budget of the United States. Carbon pools and flux under alternative policy options.* EPA/600/3-93/093 Corvallis, OR: Environmental Research Laboratory, US Environmental Protection Agency. 202 pp.

US EPA. 1992. *Cooling our Communities: A Guidebook on Tree Planting and Light-Colored Surfacing.* 22P-2001. Pittsburgh, PA: Superintendent of Documents. 217 pp.

Vasievich, J. Michael and Ralph J. Alig. 1996. Opportunities to Increase Timber Growth and Carbon Storage on Timberlands in the Contiguous United States. In Sampson, R. Neil and Dwight Hair (eds), *Forests and Global Change, Volume 2: Forest Management Opportunities for Mitigating Carbon Emissions.* Washington, DC: American Forests. 91-104.

Wright, Lynn L. and E. E. Hughes. 1993. U.S. Carbon Offset Potential Using Biomass Energy Systems. *Water, Air and Soil Pollution* 70(1-4):483-498

Wright, Lynn L., Robin L. Graham, Anthony F. Turhollow, and Burton C. English. 1992. Growing Short-Rotation Woody Crops for Energy Production, in: Sampson, R. Neil and Dwight Hair (eds), *Forests and Global Change, Volume 1: Opportunities for Increasing Forest Cover*, Washington DC: American Forests, pp. 123-156

July 7, 1997

HOW FORESTS CAN HELP REDUCE CARBON DIOXIDE EMISSIONS TO THE ATMOSPHERE

July 7 1997

by
John Perez-Garcia,
Associate Professor
*
Chadwick D. Oliver,
Professor
*
Bruce R. Lippke,
Professor and Director
Center for International Trade in Forest Products

College of Forest Resource
University of Washington
Box 352100
Seattle, WA 98195-2100

perjohm@u.washington.edu
206 685 2315 (voice)
206 685 0790 (fax)

July 7, 1997

Summary

Carbon exists in several forms (a.k.a. "pools") such as in limestone rocks, fossil fuels (oil and coal), forest wood, and carbon dioxide in the atmosphere. Carbon can move from one "pool" to another. There is concern that carbon is moving into the atmosphere very rapidly in the form of carbon dioxide emissions.

Three approaches have been suggested for forests to help reduce carbon dioxide addition to the atmosphere:

Carbon dioxide can be taken out of the atmosphere by allowing the growing forest to absorb carbon (photosynthesis) and store it as wood in the forest.

Carbon dioxide can be taken out of the atmosphere by harvesting the forest before it decomposes or burns and storing the carbon in less rapidly decomposing forest products.

Carbon dioxide can be kept out of the atmosphere by using wood products as substitutes for aluminum, steel, concrete, brick, and other products which consume much more fossil fuels (and release more carbon dioxide) in their manufacture.

Detailed analyses suggest unintended consequences of some of these approaches. Certain generalities can be made:

1. By far the most effective way to keep carbon dioxide out of the atmosphere is to use wood products instead of substitute products which use more fossil fuels;
2. If begun now, planting and growing more forests to take the carbon dioxide out of the atmosphere can be effective for a short interval several decades from now; however, it can be counterproductive in the longer term if the use of wood products is not increasing;
3. Keeping forests from being harvested, and so keeping carbon stored in the standing trees, can be useful provided:
   -- more fossil fuel-consuming products are not used in place of wood products, and
   --forests in other regions are not harvested more rapidly to replace timber from unharvested forests.
4. Many of the well-intended conservation efforts of the past decade are increasing the atmospheric carbon dioxide more than targeted reduction programs are reducing it.

July 7, 1997

CONTENTS

PREFACE 3
INTRODUCTION 4
USE OF WOOD AS SUBSTITUTES 7
ALLOWING THE GROWING FOREST TO ABSORB & STORE CARBON 11
Reforestation of unforested areas....11
Increasing management intensity on productive lands....15
Setting aside forest "Reserves"....15
Combined effects of recent policies....17
STORING CARBON IN FOREST PRODUCTS....19
Effects of recycling....19
GENERAL DISCUSSION....19
LITERATURE CITED....21

PREFACE

This paper examines the single issue of the effects of different forest policy and management strategies on the forests' contributions to atmospheric carbon dioxide changes. Any policy and management approach would need to be balanced with considerations for achieving other values. This paper does not discuss the other values, or the effects of each policy on these other values.

This paper does not address the issue of whether increases in atmospheric carbon dioxide has been shown to lead to global warming. This paper simply examines the effects of different forest policy and management approaches on the changes in atmospheric carbon dioxide.

There are many uncertainties in data and information surounding the subject of atmospheric carbon dioxide. The paper provides the best knowledge available; however, the reader should be aware that, like all sciences, some of the analyses are subject to change as more knowledge is gained. Like all science, this analysis should be considered open-ended; and constructive, scientifically rigorous critiques are welcome.

The paper examines the changes in global carbon dioxide emissions relative to 1990, since this is considered the base year in the global warming convention.

July 7, 1997

INTRODUCTION

Carbon exists in several forms (a.k.a. "pools")[1] such as in limestone rocks, fossil fuels (oil and coal), forest wood, and carbon dioxide in the atmosphere. Carbon can move from one "pool" to another. There is concern that carbon is moving into the atmosphere very rapidly in the form of carbon dioxide emissions. Carbon moves from the fossil fuel "pool" to atmospheric carbon dioxide very rapidly through the combustion of fossil fuels for energy, but does not readily convert back to fossil fuels (Figure 1).

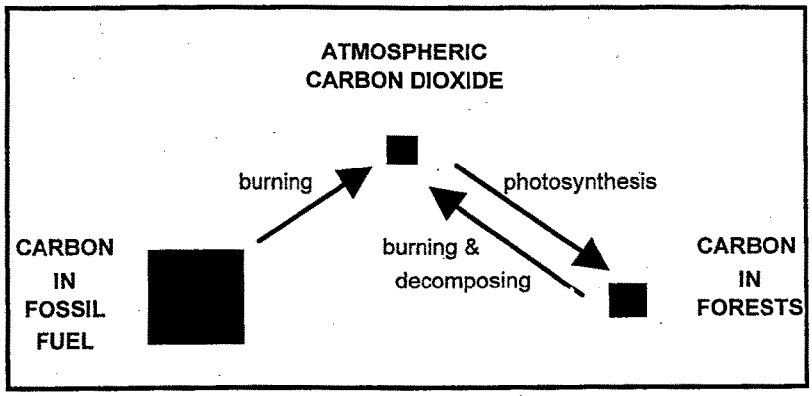


Figure 1. *Forestry-related ways that atmospheric carbon dioxide levels can change. Carbon dioxide can increase in the atmosphere by burning of fossil fuels and by burning or decomposing of wood. Carbon dioxide can decline in the atmosphere by the forest absorbing (photosynthesis) and storing the carbon as wood. Boxes show relative sizes of "pools" of carbon. (See Figures 13A & B for more detail.)*

[1] Terminology specific to carbon analysis will be minimized in this paper; however, the following terms are generally used: "sinks" capture or sequester carbon; "sources" emit carbon; "pools" store carbon (i.e., they act as "reservoirs"); "flux" is the net change in carbon from a "pool" (other than the atmosphere) to the atmosphere.

July 7, 1997

Carbon also moves from the forest "pool" to atmospheric carbon dioxide rapidly when trees or wood rot or burn, and moves rapidly back from atmospheric carbon dioxide to the forest "pool" through forest growth (photosynthesis). Limestone rocks and other "pools" of carbon dioxide do not appear to be converting to atmospheric carbon dioxide rapidly.

The estimated U.S. total addition of carbon dioxide to the atmosphere has increased from 1,353 million metric tons carbon-equivalent (MMTCE) in 1990 to 1,422 MMTCE in 1995 (Figure 2; U.S. E.P.A. 1995). Fossil fuel combustion represents

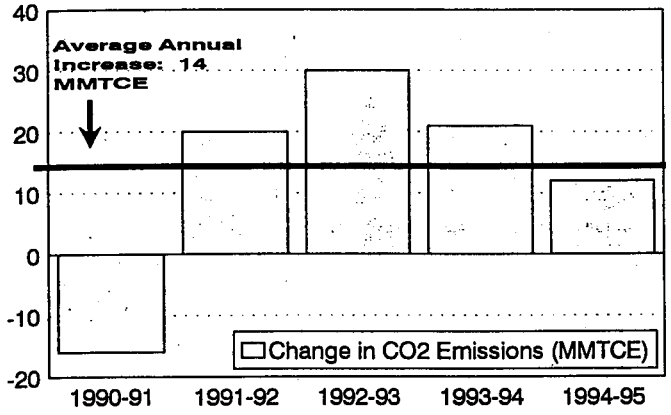


Figure 2. Change in annual carbon emissions from 1990 to 1995 and the average annual change in emissions. Baseline is the 1990 emission level estimated at 1,336 MMTCE. (Source U.S. EPA 1997)

nearly 99 percent of the total emissions. Estimated annual change in carbon dioxide emissions from fossil fuel combustion has varied from a reduction of 16 MMTCE from 1990 to 1991 to an increase of 30 MMTCE from 1992 to 1993 (Figure 2). The average addition for the 1990 to 1995 period is estimated at 14 MMTCE per year. The change in carbon dioxide is dependant on economic activity; generally when the economy is growing, so does carbon dioxide emissions since more fossil fuels are used. National goals have been established to reduce carbon dioxide emissions to the 1990 condition.

Three ways have been suggested for forests to be used to reduce carbon dioxide addition to the atmosphere (Figure 3; Sampson and Hair 1992, 1996; Harmon

et al. 1990, Oliver et al. 1990, Kershaw et al. 1993, Koch 1991, Perez-Garcia 1995a,b). Each of these will be discussed:

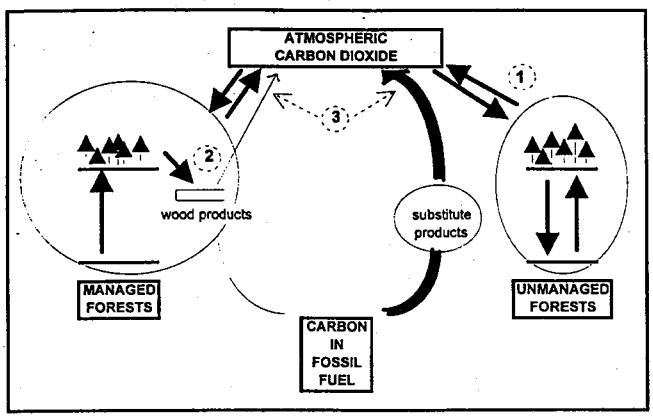


Figure 3. *Forests can help reduce carbon dioxide addition to the atmosphere in three ways: 1. Allowing the growing forest to absorb and store carbon; 2. Storing carbon in forest products; 3. Using wood to substitute for more fossil fuel-consuming alternatives (e.g., steel, concrete, aluminum, brick). # 3 is the most effective way. (See Figures 13A & B for more detail.)*

Carbon dioxide can be taken out of the atmosphere by allowing the growing forest to absorb carbon (photosynthesis) and store it as wood in the forest.

Carbon dioxide can be kept out of the atmosphere by harvesting the forest before it decomposes or burns and storing the carbon in less rapidly decomposing forest products.

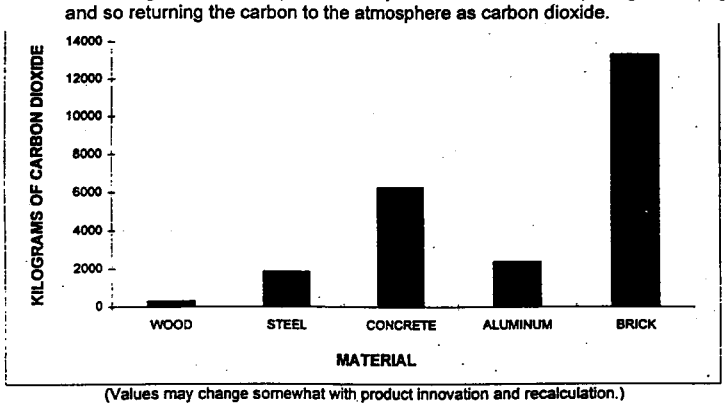
Carbon dioxide can be kept out of the atmosphere by using wood products as substitutes for aluminum, steel concrete, brick, and other products which consume much more fossil fuels in their manufacture (Figure 4).

July 7, 1997

Use of Wood as Substitutes for More Fossil Fuel-Consuming Products

Forest management for timber products stores carbon in products with longer lifetimes, providing two ways of keeping carbon dioxide from the atmosphere:

1. Forest products consume less carbon dioxide-producing fossil fuel for their transport and manufacture than substitute products consume.
2. Converting trees to wood products keep the wood from decomposing or burning and so returning the carbon to the atmosphere as carbon dioxide.



(Values may change somewhat with product innovation and recalculation.)

Figure 4. *Carbon dioxide released to produce wood products and their substitutes. Materials made from wood add much less carbon dioxide to the atmosphere than substitute products. (information from CORRIM 1976)*

Wood used for most industrial and building purposes can be replaced by substitutes which require the use of two to eight times more fossil fuel than wood for their manufacture and transport (Figures 4 & 5; CORRIM 1976; N.B. numbers used in this section are based on the 1976 CORRIM report. This report needs to be updated to account for technological and analytical improvements.).

Consequently, using wood in place of substitute products can dramatically reduce carbon dioxide emissions to the atmosphere. For example, the stopping of timber harvest on millions of acres of forests in the Pacific Northwestern United States (under the Northwest Forest Plan [FEMAT 1993]) is calculated both to shift the harvest of timber to other parts of the world and to shift to the use of non-wood substitute

July 7, 1997
products. The action was intended to reduce harvest on National Forests in the United States by four billion board feet.[2] Nearly 34 percent of this reduction in timber harvests is calculated to be made up for by use of non-wood substitute products (Perez-Garcia 1995b). This substitution, in the near term, can lead to an increase in carbon emissions of 19 MMTCE because more fossil fuel is burned with greater use of non-wood products.

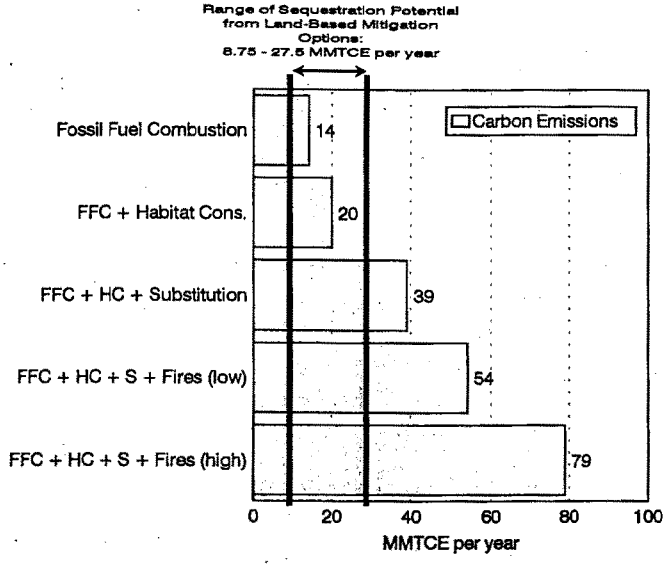


Figure 5. *Increased annual carbon dioxide added to the atmosphere ecause of habitat preservation, product substitution, and wildfires. Increased carbon dioxide caused by the*

[2] Carbon impacts reported by Perez-Garcia (1995a) are based on a projected reduction of about 4 billion board feet (bbf) in the Pacific Northwest, and an additional 4 bbf reduction in coastal British Columbia. Actual reductions in the western United States have been much larger--nearly twice the number used in the Perez-Garcia policy analysis (see Figure 6).

average increase in fossil fuel use (see Figure 2) is included for comparative purposes. The range of carbon dioxide absorption and storage by forests because of tree planting programs on marginal crop lands is illustrated with heavy vertical lines.

Other analyses (Koch 1991, Lippke 1991) have estimated even higher carbon dioxide emission increases. Koch (1991) estimated, for example, the reduction of 8.25 billion board feet of harvest from these lands (Figure 6) has the potential to release 62 MMTCE into the atmosphere by using more non-wood products.[3]

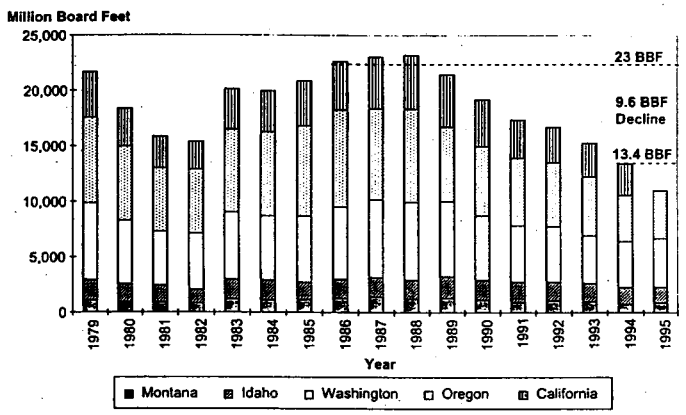


Figure 6. *Regional conifer timber harvest volumes from the Pacific Northwestern United States, 1979-1995. 1995 California Data is not available. (Source: USFS Production, Prices, Employment, and Trade in Northwest Forest Industries)*

This increased addition of between 19 and 62 MMTCE per year of carbon dioxide to the atmosphere is a result of substituting other products for about five percent of the forest products harvested and consumed in this country.[4] Further

[3] The low number of 19 MMTCE was because part of the harvest reductions were offset by timber produced elsewhere. With actual reductions of over 9 billion board feet (See Figure 6), a higher figure is more probable.

[4] Timber harvests have declined by about 9.6 billion board feet in the western United States (Figure 6). The total national harvest is 80 billion board feet. Since approximately one third (34%) of the reduction is compensated for by substitute products, the estimated substitution was 4.6 percent (34% X 9.6/80) of the

substitution of more polluting products for wood would lead to more carbon dioxide emissions to the atmosphere.

The United States was (prior to the President's Northwest Forest Plan harvest reductions) harvesting approximately 60 percent of its gross growth [5] (increase in timber volume) each year, with considerable variation among regions and species (Figure 7). If the harvest level were increased to 75 percent of the gross growth, another 60 to 180 MMTCE per year of carbon dioxide could be kept out of the atmosphere.

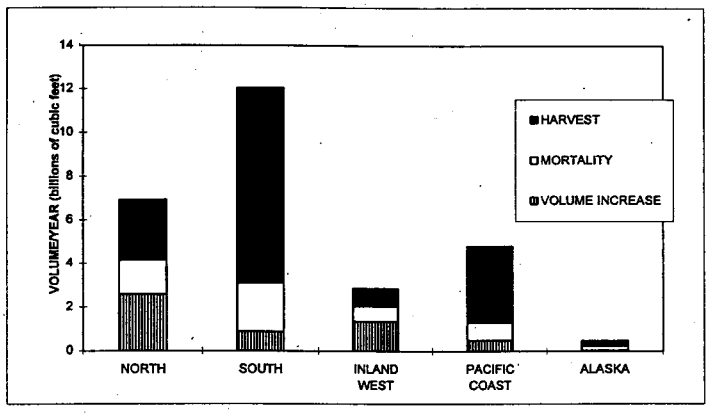


Figure 7. *Timber harvest, mortality, and volume increase in each region. There is a net volume increase in all regions, although some species and regions are less heavily harvested than others. Increased timber harvest could especially occur in the Inland West and North. (from Powell 1993 and Oliver et al. 1997)*

In addition, silvicultural operations such as thinning, pruning, and increasing rotation lengths can produce higher quality of timber, which can be more readily used in

---

wood products produced and consumed in the United States. Net wood imports and exports to and from the United States are currently approximately equal; consequently, wood product production and consumption are approximately equal (Powell et al. 1993, Oliver et al. 1997).

[5] Approximately 75% of its net growth; see Powell et al. (1993) and Oliver et al. (1997) for definitions.

place of the more fossil fuel-consuming wood substitutes. These activities also can promote wildlife habitats and reduce catastrophic fire, insect, and wind losses (Oliver 1992, Oliver et al. 1997).

Allowing the Growing Forest to Absorb Carbon (photosynthesis) and Store it as Wood in the Forest

The Environmental Protection Agency reported that U. S. forests absorbed 125 MMTCE in 1990 (U.S. EPA 1995a). The most recent inventory of U.S greenhouse gas emissions and absorptions indicate the forest absorption has declined from 125 MMTCE in 1990 to 117 MMTCE in 1995 (US EPA 1997). The major influences on net carbon absorption from forest land are management activities and ongoing impacts of previous land-use changes. Soil and forest floor carbon absorption are not included in the above estimates because of uncertainties associated with their estimation.[6,7]

Marland (1988) and Sedjo and Soloman (1990) have provided estimates of the forest area required to absorb the world's annual net production of carbon dioxide (which largely comes from burning fossil fuels). Their estimates are large and reflect the limited ability of using forests only as a carbon store to act as a buffer to human production of carbon dioxide from fossil fuel. According to Marland, it would require an area equivalent to the total area of global forest clearing to date of new tree plantations to absorb enough carbon dioxide to offset current global carbon dioxide emissions from fossil fuels combustion. Sedjo and Soloman estimated that an area equal to half of the US is needed to counter U.S. carbon dioxide emissions. The two studies suggested that the total elimination of fossil fuel-derived carbon dioxide additions to the atmosphere is not practical.

Reforestation of Unforested Areas as a Way to Remove Carbon Dioxide from the Atmosphere

A recent panel proposed the reforestation of 73 million acres of economically or environmentally marginal crop and pasture lands and nonfederal forest lands to sequester 10 percent of US carbon dioxide emissions (National Academy of Science,

[6] This uncertainty and others are important. Soil carbon has been estimated to comprise 61% of the total forest carbon pool. Uncertainty concerning above ground stores of carbon exists are caused by statistical methods used to estimate rather than measure biomass above ground. Forest inventories are undertaken only every decade, which adds to uncertainty in annual estimates of growth, mortality and standing biomass.

[7] According to EPA's 1995 inventory of greenhouse gases, the total forest carbon change is the sum of changes to the carbon in the forest (estimated at 13,567 MMTCE in 1987 and 14,057 MMTCE in 1992) plus changes in carbon in wood in landfills (estimated at 1,236 MMTCE in 1980 and projected at 1,533 MMTCE in 2000) plus carbon in wood products (estimated at 1,272 MMTCE in 1980 and predicted at 1,520 MMTCE in 2000). The change in carbon pool from one time to the next is used to calculate the annual "flux," or change.

et. al., 1991, p 57, Table 6.1). More recently, other mitigation strategies in the forest and agricultural sector have been proposed to increase carbon sequestration. The effect of these programs are summarized in U.S. EPA (1995b).

Tree planting on marginal crop and pasture land can reduce atmospheric carbon dioxide by absorbing and storing (sequestering) carbon in wood by 500 to 800 MMTCE in 2040 over 50 years, with approximately one-fourth of the total achieved by 2010. This represents an average of 10 to 16 MMTCE per year. Although this average is misrepresentative of the time distribution of the benefits of carbon sequestration, it helps focus on the potential magnitudes for comparison purposes with other options. One tree planting program, the Conservation Reserve Program, is expected to absorb almost 350 MMTCE of carbon dioxide and store it in the U.S. forest carbon pool by 2035, with approximately two-thirds of the total achieved by 2015. A "large" conservation reserve program of attracting and maintaining an additional 50 million acres in forests would provide the largest gain by any program, storing over 1,100 MMTCE by 2035. The average for both these CRP programs ranges from 8.75 to 27.8 MMTCE per year. All the above programs carry costs associated with their implementation.

Figure 8 illustrates the potential gains in carbon dioxide removed from the atmosphere and stored in forest above ground biomass and products for a small and large program to plant trees on marginal lands.

The numbers in Figure 8 are taken from Perez-Garcia (1995a). The annual average addition in carbon emissions from fossil fuel combustion--14 MMTCE per year- is also shown. The estimated gains in carbon sequestration from tree planting programs are lower than those reported by U.S. E.P.A. (1995b) because soil carbon changes are not included. But the distribution of the carbon benefits over time are similar. The carbon dioxide taken out of the atmosphere and stored in U.S. forests increases as new plantations grow. The storage levels off and declines and carbon dioxide returns to the atmosphere as the new plantation timber is harvested. Maximum carbon absorption from the atmosphere by plantings occurs in the year 2010, with the "large" planting program surpassing the average annual increase in carbon dioxide caused by fossil fuel consumption.

Counterproductive Effects of Reforesting Lands of Marginal Productivity. The analyses indicate that carbon storage in new forests can be important, but it may not be efficient and can be counterproductive. Tree planting programs increase the supply of timber and impact forest management in indirect ways. Forests grown on marginally productive crop lands are less efficient in storing carbon than forests on more productive lands. The average productivity of the forest land base declines as the less productive marginal crop and environmentally sensitive land areas are planted to trees.

July 7, 1997

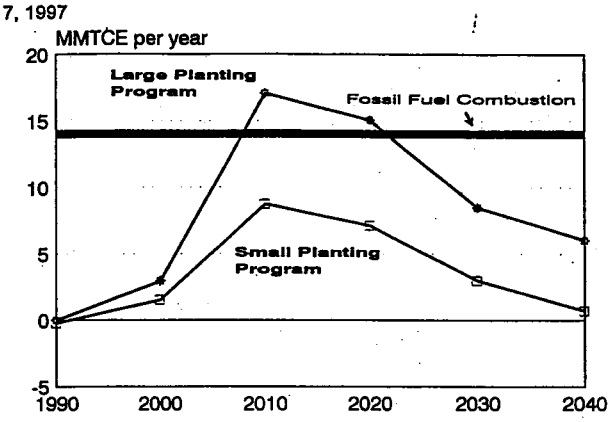


Figure 8. *The effects of two tree planting programs on absorption and storage of atmospheric carbon dioxide by U.S. forests and forest products. The average annual addition of carbon dioxide emission above the 1990 level (see Figure 2; 1990-1995) is shown for comparative purposes. (Source: Perez-Garcia 1995)*

Figure 9 illustrates how the U.S. and global forest carbon absorption and storage of the two tree planting programs change. The tree planting program effects on the global forest carbon absorption and storage are the same as total U.S. forest impacts until harvesting begins. As the U.S. carbon dioxide program plantations are harvested, acreage in other regions of the U.S. and world remain in trees and increase the forest absorption and storage internationally. As harvests from the newly planted areas in the U.S. decline, these other regions begin to harvest timber which reduces the global forest absorption and storage of carbon dioxide past baseline conditions under the small planting program. Many factors may be involved in the reduction of the global forest absorption and storage of carbon dioxide over time. One important factor is that average forest land productivity declines as large areas of marginal timber lands become a larger part of the timber land base. As U.S. forests from tree planting programs are harvested, they replace timber harvests from more productive lands, thus reducing the forests' total absorption and storage of carbon dioxide. These problems can be at least partially offset if there is an expanded use of wood to maintain efficient management on the most productive sites.

July 7, 1997

A similar result is reported for land-use changes projected from the withdrawal of productive timber lands in the PNW (see Perez-Garcia 1995b). When acreage is preserved for endangered species habitat, other timber land owners harvest more acres and produce less timber, since less productive lands are harvested to offset the decline of more productive lands.

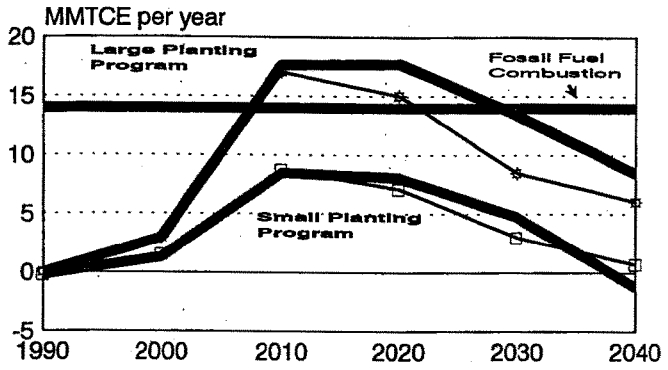


Figure 9. *The effects of two tree planting programs on absorption and storage of atmospheric carbon dioxide by U.S. and global forests and forest products. The programs' effects on global carbon forest and product absorption are shown in heavy lines for each program. The average annual addition of carbon dioxide emission above the 1990 level (see Figure 2; 1990-1995) is shown for comparative purposes. (Source: Perez-Garcia 1995)*

Other impacts can also occur when new forests are created if these forests are perceived as potentially harvestable. Winnett et al. (1994) reported a substantial decline in prices paid for timber when tree planting programs were begun. Unless the use of wood products is expanded, the programs reduce the prices of harvestable timber and so reduce incentives to manage forest land. As a consequence, the new forests compete with existing plantations and become a substitute for other harvestable forests rather than provide an additional inventory of harvestable forests.

Increasing the Intensity of Management on the Most Productive Forest Lands as a Way to Remove Carbon Dioxide from the Atmosphere

July 7, 1997

There is a direct relationship between timber growing and price of timber products. For every 1% price increase, 1% more volume of timber is grown (Sedjo 1981; Larsen and Wadsworth 1982). Furthermore, timber growing and harvesting on more productive forest lands take less energy and cost less because more timber is grown and harvested per acre. Timber could be provided with the least energy and cost by intensively managing more productive lands to the limit of our management technology before planting marginal acres. More intensively managing more highly productive lands will produce higher quality wood faster, which generally will substitute for more energy intensive products and store more carbon than planting trees on less productive acres.

Setting aside forest "Reserves", where no Commodity Extraction is Done as a Way to Remove Carbon Dioxide from the Atmosphere

Analyses by Harmon et al. (1990) suggested that more carbon dioxide can be kept out of the atmosphere by allowing forests to grow to old conditions without harvest than by harvesting and managing forests. Their findings suggest that setting aside reserves where such harvesting is avoided could be an efficient way to reduce atmospheric carbon dioxide emissions. Oliver et al. (1990) did a similar analysis and agreed with the findings provided more polluting, non-wood products were not substituted for the wood not harvested. However, Oliver et al. (1990) found that avoiding harvest of forests, but using non-wood substitute products instead, dramatically increases the carbon dioxide additions to the atmosphere. Neither of these studies considered the effects of wood substitutes from less productive forests. If these wood substitutes are considered, avoiding the harvest of highly productive forests while harvesting forests on less productive lands further increases the carbon dioxide additions to the atmosphere.

The effects of using wood from less productive forests while not harvesting productive forests can be understood by using the Pacific Northwestern United States as an example. As a result of curtailing harvest on the highly productive lands of the Pacific Northwest (described earlier), less productive lands were harvested to make up for the resulting wood shortages. As a consequence, carbon stored in wood and fossil fuels nationally and internationally declined, with the extra carbon being sent to the atmosphere as carbon dioxide (see Figure 10). By 2040, the projected effects of curtailing harvest in the Pacific Northwest is a decline in international forest carbon dioxide absorption as large as the immediate decline in national forest carbon absorption (Perez-Garcia 1995a). This reduction in carbon dioxide absorption by the forests does not include the extra carbon dioxide released by fossil fuel consumption when non-wood products are substituted for wood products as the market prices change. The combined consequences of both harvesting less productive forests and using substitute products make the policy of allowing forests to grow to old conditions

and not be harvested counterproductive to achieving the objective of reducing carbon dioxide emissions and levels in the atmosphere.

There can be other increases in atmospheric carbon dioxide caused by allowing forests to grow to old conditions and not be harvested. The western United States'

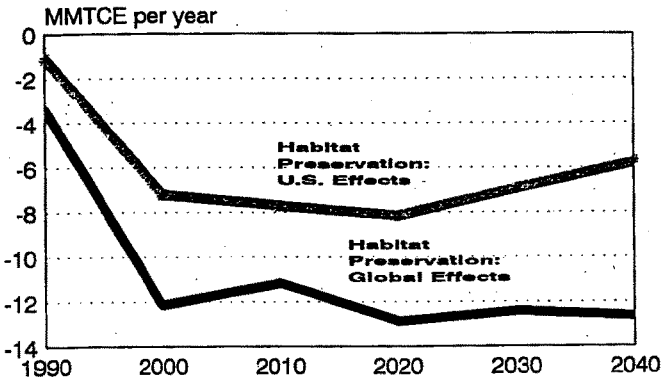


Figure 10. *Effect of not harvesting timber from forests (habitat preservation) in the Pacific Northwestern United States on the change in atmospheric carbon dioxide. Negative numbers indicate increases in atmospheric carbon dioxide. The amount of carbon dioxide removed from the atmosphere and absorbed and stored by forests is reduced because of forest land use changes which lower use of timber (relative to more polluting substitutes) and increase forest management of less productive forest lands in the U.S. and globally. (Source: Perez-Garcia 1995)*

forests, for example, will absorb and store carbon dioxide for a while. Left unmanaged, however, these forests will be destroyed by winds, insects, and (often subsequently) fires (Figure 11). Fires (or rotting wood following catastrophic winds or insect outbreaks) release carbon from the dead trees and add it to the atmosphere as carbon dioxide. A recent preliminary study by Sampson et al., (1996) suggested that wildfire in the West can release 15 to 20 MMTCE per year under current conditions. The carbon emissions can be as high as 40 MMTCE for years of intense fires such as 1996. This release of carbon from forests to the atmosphere can eliminate the gains achieved in

the tree planting programs described above and double or triple the amount of carbon dioxide which would need to be absorbed and stored to maintain the 1990 carbon dioxide emission level.

Combined effects of many recent environmental policies

Many recent environmental policies related to forest management, product substitution, and habitat conservation have probably reduced the forest's contribution to keeping carbon dioxide out of the atmosphere. The combined impacts of these events are larger than the potential benefits of tree planting programs proposed to reduce carbon dioxide additions to the atmosphere.

Figure 5 illustrates how habitat conservation efforts, product substitution, and wildfire may contribute to much larger additions of carbon dioxide to the atmosphere than the reductions provided by the tree planting programs. As a reference point, increased fossil fuel use has increased carbon emissions by 14 MMTCE per year on average from 1990 to 1995 (Figure 2). Tree planting programs will remove carbon dioxide from the atmosphere and store it in wood in standing forests, wood products, and in landfills (after the products are disposed). Figure 5 illustrates the range of carbon absorption and storage by tree planting programs as two solid lines at 8.75 and 27.5 MMTCE per year, the respective low and high estimates under different tree planting programs. These programs are able to offset the average annual increase in carbon dioxide emissions to the atmosphere from the fossil fuel combustion, since the bar falls within the range of the tree planting programs.

Six MMTCE per year of additional carbon dioxide are added to the atmosphere as a result of habitat conservation programs in the western U.S. forests, which reduce the forest absorption and storage in biomass and products (see Figure 10). The reduction in forest carbon absorption and storage must be added to the 14 MMTCE per year increase in carbon emission associated with greater fossil fuel combustion--making the addition of carbon to the atmosphere 20 MMTCE per year higher than in 1990--if the 1990 carbon dioxide emission level is a target to maintain. To meet this target, the goal of tree planting programs would now be to reduce carbon dioxide emissions by 20 MMTCE per year, and the planting programs may still reach that goal. When the effects are considered of using substitute products in place of wood because of the lower availability (and higher prices) of wood products caused by timber sales reduction, the forest absorption and storage declines further and adds 19 MMTCE per year more carbon dioxide to the atmosphere. To maintain 1990 levels of carbon emissions, tree planting programs need to recover 39 MMTCE per year (20 MMTCE plus 19 MMTCE). The 39 MMTCE per year surpasses the most optimistic tree planting program of 27.5 MMTCE per year. Wildfires will further decrease the forests'

absorption and storage of carbon dioxide from the atmosphere (Sampson et al. 1996). During a year of low fire occurrence (Figure 11) when about 15 MMTCE of carbon are added to the atmosphere through wildfires, the total amount of carbon dioxide removal from the atmosphere needed to maintain 1990 levels is 54 MMTCE (39 MMTCE plus 15 MMTCE)–twice the amount the largest tree planting program can absorb and store if

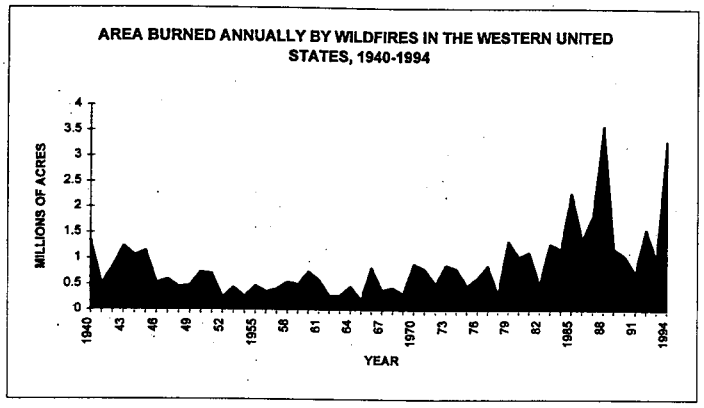


Figure 11. *Area burned annually by wildfires in the western United States. The increasing wildfires are adding much carbon dioxide to the atmosphere, and reducing the option of utilizing the timber to avoid further addition of carbon dioxide to the atmosphere. (from Oliver et al. 1997)*

fully implemented. During a year of intensive fires, such as the 1996 fire season, wildfires in combination with the other reductions in carbon dioxide absorption and storage by forests, raise carbon dioxide additions to the atmosphere from forests to 79 MMTCE.

The above scenario may very well take place. Habitat conservation has substantially reduced output from federal forest lands in the West, higher wood product prices have already increased the use of non-wood products in traditional wood end-use markets, and large fuel buildups in the forests can be expected to lead to a higher fire occurrence over the coming decades. As a result, the forests and forest products are likely to decline in their absorption and storage of carbon dioxide from the

atmosphere--and in their substitution for more fossil fuel-consuming products. Strategies that increase the use of wood products use may prove more efficient in lowering atmospheric carbon dioxide than present proposals.

Storing Carbon in Forest Products through Management and Harvest

Carbon dioxide can be kept out of the atmosphere by making products which keep the wood from decomposing and thus sending carbon dioxide back into the atmosphere. Whereas this means of carbon storage is important, the amount of carbon stored in the wood products (and thus kept out of the atmosphere) is inconsequential compared to the amount of carbon dioxide kept out of the atmosphere in the same process by the use of wood rather than substitute products, as described above.

Effects of Recycling--for Energy or Products

Recycling is generally done with paper (fiber) products. The recycled material can be made into more products or burned for energy--as a substitute for fossil fuel energy. In both cases, they keep carbon dioxide out of the atmosphere provided that the recycling process does not require so much energy that more carbon dioxide is released to the atmosphere than is kept out. Studies have generally shown that recycling keeps carbon dioxide out of the atmosphere (see EPA 1995b, Perez-Garcia 1995a). The estimated benefit can be substantial in meeting the target of emission reductions (see Figure 12). Global effects are also positive, since fewer forests are harvested and the standing forests absorb and store carbon dioxide from the atmosphere.

The above studies have not estimated the cost of transportation associated with getting the recycled materials to the factory, nor examined the use of fiber as an energy source rather than fiber source. Processing plants in North America are not currently efficient for recyling, since they are located near forests, whereas recycled materials are produced in urban areas. It is uncertain if more carbon dioxide can be kept out of the atmosphere by using the recycled materials for energy as substitutes for fossil fuels, or by using the material to produce products. One such study for Europe suggests that recycled fiber for energy has more value than for fiber (Bystrom and Lonnstedt 1995).

General Discussion

The greatest way forests can reduce the amount of carbon dioxide added to the atmosphere is to use wood products in place of substitutes (e.g., steel, aluminum, concrete, brick) which consume more fossil fuels in their manufacture--and so add much more carbon dioxide to the atmosphere. The role of wood products in storing carbon in a non-decomposing condition so it does not return to the atmosphere is

important, but inconsequential compared to the carbon kept out of the atmosphere in the same process by avoiding use of fossil fuels.

Overall the more acres in forest land, and used for products, the greater the carbon dioxide kept out of the atmosphere, largely from the displacement of fossil fuel

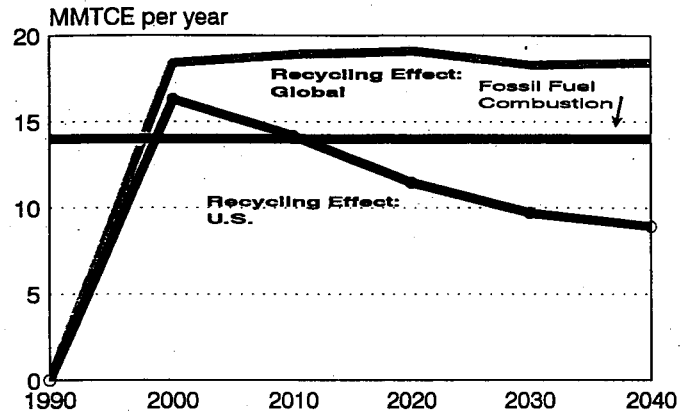


Figure 12. *The effect of wood fiber (paper) recycling on the amount of additional carbon dioxide U.S. and global forests can remove from atmosphere by absorbtion and storage. The average annual addition of carbon dioxide emission above the 1990 level (see Figure 2; 1990-1995) is shown for comparative purposes. (Source: Perez-Garcia 1995)*

energy used to produce substitute non-wood products and secondly from extending the storage beyond forests to durable products used in society. Forest preservation does not directly increase carbon emissions; naturally-forested acres exist in a stable carbon balance. To the degree that forest preserves reduce the wood available for products, they increase carbon emissions by increasing the use of substitute non-wood products.

Growing more forests can help remove carbon dioxide from the atmosphere at some times and conditions; however, this impact on reducing atmospheric carbon dioxide is less than the avoiding of fossil fuel consumption through the use of wood products.

July 7, 1997

Curtailing of timber harvest, such as recently done on U.S. National Forests, has led to higher timber prices and has resulted in two responses which increase the amount of carbon dioxide added to the atmosphere:

--First, the higher prices have increased the amount of non-wood substitute products being used, which add more carbon dioxide by using fossil fuels in their manufacture. As an example, the steel industry has set a target to reach 25% of the residential housing market by the year 2000. Higher wood product prices resulting from the curtailing of timber harvest are forecasted to continue into the next century. These higher prices will help the steel industry reach its target.

--Second, higher timber prices and the shortage of timber have caused people to harvest their forests when younger (shorter rotation age). Shorter rotation ages lead to less removal and storage of atmospheric carbon dioxide by the forest as well as lower quality timber products which do not provide very good substitutes for more polluting non-wood materials.

Literature Cited

Briggs, D. 1995 (personal communication to Bruce Lippke).

Bystrom, S. and L. Lonnstedt. 1995. Waste paper usage and fiber flow in Western Europe. Resources, Conservation and Recycling 15(1995):111-21.

Forintek Canada Corp. and Wayne B. Trusty and Assoc., Ltd. 1993. Building Materials In the Context of Sustainable Development. Phase II Summary Report, prepared for Canadian Forestry Service, Natural Resources Canada.

Committee on Renewable resources for Industrial Materials (CORRIM). 1976. Renewable Resources for Industrial Materials. A Report of the Committee on Renewable Resources for Industrial Materials, Board of Agricultural and Renewable Resources, Commission on Natural Resources. National Research Council, National Academy of Sciences, Washington, D.C.

Harmon, M.E., W. K. Ferell and J. F Franklin. 1990. Effects on carbon storage of conversion of old-growth forests to young forests. Science 247:699-702.

Kershaw, Jr., J. A., C. D. Oliver and T. M. Hinckley. 1993. Effect of harvest of old growth Douglas-fir stands and subsequent management on carbon dioxide levels in the atmosphere. Journal of Sustainable Forestry: 1:61-77.

Koch, P. 1991. Wood versus non-wood materials in U.S. residential construction: some energy related international implications. Forest Products Journal Vol(#):pgs

July 7, 1997
Larsen, D. N. and R. K. Wadsworth. 1982. Timber Harvest Projections for the 1980's and Future Decades in the State of Washington. Washington Forest Productivity Study Phase III, Part II. Department of Natural Resources, State of Washington. Olympia.

Lippke, B. R., J Sessions, and A. B. Carey. 1996. Economic Analysis of Forest Landscape Management Alternatives. Joint Publication of USDA Forest Service, Pacific Northwest Research Station, Washington State Department of Natural Resources, and CINTRAFOR Special Paper 21. Seattle.

Lippke, B. R. 1991. Meeting the need for environmental protection while satisfying the global demand for wood and other raw materials: a North American and global trade perspective. In: Proceedings of the Forest Products Research Society Conference on Wood Product Demand and the Environment, Vancouver, British Columbia, Canada. Madison.

Marland, Greg. 1988. The Prospect of Solving the CO2 Problem through Global Reforestation. Report DOC/NBB-0082. U.S. Department of Energy, Office of Energy Research. Washington, D.C.

National Academy of Science, National Academy of Engineering, and Institute of Medicine. 1991. Policy Implications of Greenhouse Warming-Synthesis Panel. Committee on Science, Engineering and Public Policy. National Academy Press, Washington, D.C.

Oliver, C. D., J. A. Kershaw and T. M. Hinkley. 1990. Effects of harvest of old-growth douglas fir and subsequent management on carbon dioxide levels in the atmosphere. Journal of Sustainable Forestry 1(1):pgs.

Oliver, C., D.Adams, T.Bonnicksen, J.Bowyer, F.Cubbage, N.Sampson, S.Schlarbaum, R. Whaley, H.Wiant, and J.Sebelius. 1997. Report on Forest Health of the United States by the Forest Health Science Panel. A panel chartered by Charles Taylor, Member, United States Congress, 11th District, North Carolina. Summary: 72 pp. Main document: 334 pp. (Submitted April 7, 1997). (Available through Internet through U.S. House of Representatives Resources Committee at: "http://www.house.gov/resources/105cong/fullcomm/apr09.97/taylor.rpt/taylor.htm") Also available as reprint through University of Washington College of Forest Resources CINTRAFOR RE43 (main document) and RE43A (summary).

Perez-Garcia, J. M. 1995a. Global Carbon Fluxes Associated with U.S. National Policies. Report Prepared for the U.S. Environmental Protection Agency, Seattle.

Perez-Garcia, J. M. 1995b. Global forest land use consequences of North American timber land withdrawals. Journal of Forestry 93(7):35-38.

July 7, 1997
Rotty, R. M. 1986. Estimates of CO2 from wood fuel based on forest harvest data. Climate Change 9:311-326.

Sampson, R. Neil and Dwight Hair. 1996. Forest and Global Change. Volume 2: Forest Management Opportunities for Mitigating Carbon Emissions. American Forests, Washington, D.C. 379 pgs.

Sampson, R. Neil and Dwight Hair. 1992. Forest and Global Change: Volume 1: Opportunities for Increasing Forest Cover. American Forests, Washington, D.C. 285 pgs.

Sampson, R. Neil, L. Neuenschwander and C. McKetta. 1996. Potential Effects on Greenhouse Gas Emissions from Forest Management Options to Affect Wildfire Risk in the 11 Western States. Draft Report prepared for the U.S. Environmental Protection Agency. Forest Policy Center, American Forests. Washington, D.C.

Sedjo, R. A. and A. M. Soloman 1990. Climate and Forests. in:

Sedjo, R. A. 1981. Issues in U.S. International Forest products Trade--Workshop Proceedings. Research Paper R-23. Resources for the Future, Washington, D.C.

Turner, D.P., J.J.Lee, G.J.Koerper, and J.R.Barker. 1993. The Forest Sector Carbon Budget of the United States: Carbon Pools and Flus under Alternative Policy Options. Report No. EPA/600/3-93/093. Washington, D.C.: U.S.Environmental Protection Agency, May. (Original not seen; cited in U.S.EPA 1995b.)

U.S. Environmental Protection Agency. 1997. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-1995. Office of Policy, Planning and Evaluation, U.S. EPA, Washington, D.C.

U.S. Environmental Protection Agency. 1995a. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-1994. Office of Policy, Planning and Evaluation, U.S. EPA., Washington, D.C.

U.S. Environmental Protection Agency. 1995b. Climate Change Mitigation Strategies in the Forest and Agricultural Sectors. Office of Policy, Planning and Evaluation, U.S. EPA, Washington, D.C.

Winnett, S., R. W. Haynes, and W. G. Hohenstein. 1993. Economic impacts of individual climate change mitigation options in the U.S. forest sector. Climate Research 3:121-128.

July 7, 1997

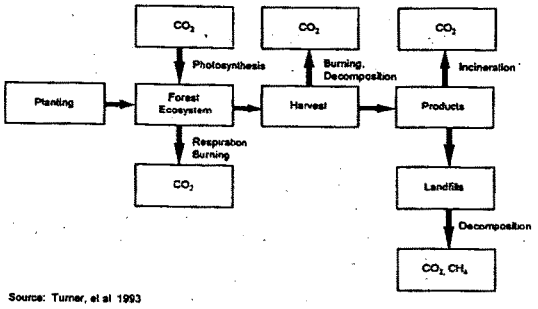


Figure 13A. *The forest sector carbon budget. (from Turner et al. 1993)*

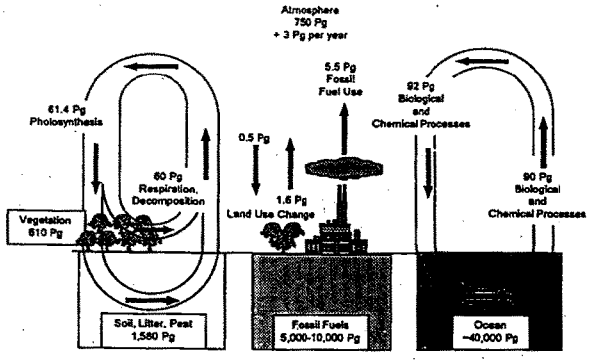


Figure 13B. *The global carbon cycle. (From U.S.EPA 1995b)*

U. S. DEPARTMENT OF INTERIOR

OFFICE OF HEARINGS AND APPEALS

In Re:	)	ESA 91-1
APPLICATION BY THE BUREAU OF LAND MANAGEMENT FOR AN EXEMPTION UNDER THE ENDANGERED SPECIES ACT FOR 44 TIMBER SALES	)	AFFIDAVIT OF GORDON ROSS

STATE OF OREGON)
) ss.
County of Coos)

I, GORDON ROSS, first being duly sworn, depose and say:

1. I am a County Commissioner for Coos County, Oregon. I make this affidavit for myself, for the entire Board of County Commissioners and for the citizens of Coos County, who deserve to be heard as their economic plight worsens. The statements contained herein are based on personal knowledge, on information given to me by Coos County employees in the regular course of their duties, and on information provided to me by citizens of Coos County who seek from their elected officials some relief from the seemingly irrational series of decisions that have brought economic ruin to their lives.

2. I have lived in Coos County for 55 years. I've farmed, logged and operated a saw mill in addition to operating the family dairy for the past 35 years. I served for 14 years as chairman of the Coos Soil & Water Conservation District Board of Directors and for 8 years on the Board of Education for Southwestern Oregon Community College. I am in

my second 4-year term as County Commissioner and member of the County Budget Committee.

3. Most of my forbearers were in Coos County before Oregon was a state, defended their homes against the fire of 1868, logged old-growth timber with oxen and settled the land that has now provided for six generations of resource-dependent families.

4. Coos County is located on the South Coast of Oregon and contains 1,000,000 acres ~~of the best~~ tree-growing land ~~in America~~. Its forest resources provide the sustenance for a major portion of its 60,000 people.

5. The citizens of Coos County are among the most self-reliant, resourceful and resilient people I know. In my lifetime I've seen them dig out from under the ravages of storm, fire and flood with the grace and dignity that only the hope in the future can bring. They have taken in stride financial reverses due to circumstances beyond their control; market slumps, the depression and recessions. Hope in the future has brought them through the hard times.

6. For 130 years the people of Coos County have harvested and regenerated our forests. We've applied better methods, achieved higher productivity and protected and enhanced our streams. The multiple uses of our forest brought about by sustained yield harvest and best management practices are now threatened to be replaced by single species management that will abate the efforts of six generations.

7. We are losing the productivity of our land and the people are losing heart in the face of ever-increasing set-asides of productive timberlands. We see the federal government setting aside an overripe crop that has heretofore been harvested on a sustained-yield basis, thereby losing it, and the new crop that could be growing, and all to save a bird that we never saw before but is now being seen everywhere in our coast range and in every forest type.

8. Never in my years have I seen the people of Coos County feel that their destiny is so completely out of their control. Never have I seen such despair, such utter lack of hope, such absolute shock as when those who have worked and provided for their families all their lives are now faced with joblessness. The despair is compounded by the lack of concern shown by the decisionmakers for their plight, and the apparent lack of hard evidence supporting the decision to favor owls over people.

9. It is impossible for numbers to convey the real social- economic effect of reduced timber harvest on the people and services in Coos County. We have numbers, but before discussing them, it is useful to address certain propositions that have been accepted as facts but which I view as myths.

a. Myth #1: We were running out of trees and sooner or later the jobs were going to be lost anyway.

Response: There is more timber growing in Coos County

today than has ever grown here since white man's coming. This continues to be the trend as we convert over-ripe old-growth, even-aged stands to young growing forests that will ultimately mature on a rotation basis. Set asides of huge areas for owl habitat destroys this productive opportunity.

b.Myth #2: If we stop logging now we will be saving timber for future generations.

Response: Timber is a renewable resource. If we do not harvest it when it is ripe, we lose it to disease, fire or windthrow. And, we not only lose this crop but the one that could be growing for future generations.

c.Myth #3 By stopping logging we are doing something positive for anadromous fish or for water quality.

Response: The time is past when we lost a fish every time we cut a tree. Through best management practices and riparian corridors, our streams in recently harvested watersheds are protected. It is not necessary to lock up the entire forest to protect our streams.

d.Myth #4 Setting aside old growth timber will provide future generations with clean air.

Response: The amount of oxygen a forest releases into the atmosphere and the amount of carbon dioxide a forest takes from the atmosphere is in direct proportion to the amount of wood fiber produced. When a forest is mature and it has no net gain of wood fiber there is no longer a net benefit to the atmosphere. It is oxidizing as fast as it is growing. In

Oregon we can grow 50,000 board feet per acre in sixty years in a healthy, well-managed forest, yet the average old growth forest harvested in the past few years has contained only 43,000 board feet, and that in 200 years of growth and decline, demonstrating a net loss.

10. If the 44 jeopardy sales are not released, using estimated scale of 189.6 million board feet located on O&C lands at 300.00 per thousand, there would be a total loss of $56,880,000.00. Under the O&C formula 50% of that would go to the O&C counties, or $28,440,000.00. Coos County's share is 5.9 percent. $1,677.960.00 would be the amount lost to the Coos County General Fund.

11. While it would be the Budget Committee's job to deal with this projected loss, it is likely the first item to disappear would be $220,000 in community support. This would include non-mandated services that we are able to supply because we receive O&C funds; programs such as supervised residential care for delinquent children, residential shelter care for abused and abandoned children, alcohol and drug treatment programs, home for battered or homeless women, telephone assistance for people to deal with problems ranging from threatened suicide to health care and other social services.

12. Next to go would be $200,000 in contingency and emergency funds. There were 15 percent across the board cuts each department this year on top of already lean budgets. To

minimize layoffs of County employees, we would need to first cut as much as possible out of Contingency and Emergency funds.

13. Starting with a revenue shortfall of $1,677,960, and after having cut $220,000 from community support and $200,000 from Contingency and Emergency funds, we would still have over $1,220,000 to cut from the budget. Last year Maintenance and supplies were cut to the bone and the only place left to cut would be Personnel. To recoup $1,220,000, one must reduce personnel by about 55 people. However, Coos County would be required to pay unemployment assistance to all laid-off employees. To fund the unemployment expense, we would be required to lay off additional employees, so the total would exceed 60 positions out of a work force of 321, or over 18% reduction in personnel supported from the General Fund.

14. To accomplish the necessary reduction in employment to save $1,220,000, we would look first at mandated services.

15. A reduction in force in the Clerk's office at this time could severely impact the integrity of the records. (Exhibit 1 hereto.) While Coos County is in an economic recession bordering on a depression, the number of transactions is up dramatically due in part to the sale of homes as people pull up stakes to look for work elsewhere.

16. The Taxation and Assessment Departments are under the level recommended by the Oregon State Department of Revenue and to reduce further in these areas would put in jeopardy our

taxation and assessment grant. (Exhibits 2 and 3 hereto.)

17. The District Attorney has made repeated requests for more help than we're able to give him now. With six murders in six months, in addition to an excessive workload resulting from a higher than ever crime rate, it would severely hamper the ability of the District Attorney to perform his duties if his budget were reduced further. (Exhibit 4 hereto.)

18. The Corrections Department is already operating at the legal minimum. A judge has told us how many people we have to have running the Jail.

19. If we did away with our Parks and Recreation Department we could lay off about 8 people, which would be an annual savings of approximately $400,000; but at the same time we would shut down 31 parks and boat ramps and incur a liability to the State Marine board and the State RV fund of approximately $3,000,000, which is much greater than the money we would save. (Exhibit 5 hereto.)

20. If we reduced the amount of General fund money to the Road Department we would soon be in trouble with the Auditor and hence, the State of Oregon, for misuse of dedicated funds as we cannot legally use gas tax or Forest Service money for the work the Road Department does for other departments. An example of an unexpected need this year was handicap access ramps at every polling place for the Elections Department, a requirement imposed on us by the Secretary of State in accordance with Federal Law.

21. The general fund supports one person in Community Corrections and that position was created upon the recommendation of a Circuit Judge. This person oversees our Community Service program, whereby these individuals do community service work in lieu of jail time so we save money on jail expenses.

22. The Planning Department is already operating at its limits and should not be reduced for the reasons the Clerk's Office should not be reduced. Additionally, the only economic development we have in Coos County is in real estate as a result of an influx of Californians. While the infux of Californians may be viewed as a mixed blessing, it is creating some jobs in the retail and building industries. To cut personnel here would create an even more unacceptable lag time between applications and department action that would keep getting longer. (Exhibit 6 hereto.) In last year's budget we doubled fees and have since closed the office to the public on Friday to try to keep abreast of the backlog.

23. We could balance the budget by eliminating the Sheriff's Department which includes 911 dispatch, emergency response, civil defense, and law enforcement. The General Fund contribution to the Sheriff's Department is $1,920,000, which is 88 percent of the total. Any cuts here would require elimination of some of the very most basic and essential services that a government is to provide.

24. The Juvenile department receives $570,000, which is

the the best buy in town. The Juvenile Department intercepts young lives that would otherwise be on the way to running the Sheriff's budget even higher. (Exhibit 7 hereto.) The only other place to turn would be the $1,000,000 budget for the Health Department with programs such as Community Health, Family Planning, Immunization Clinics, the W.I.C. Program, Environmental Services, Medical Examiner Program, Vital Records of Birth, Death, Inspection of Schools, Nursing Homes and Day Schools. With elimination of 1,200 manufacturing jobs in the past three years and many other businesses reducing health benefits we've a tremendous increase of people needing public health service. Elimination of any of these services will leave people with nowhere to turn for health care (Exhibit 8 hereto.)

25. As can be seen from the foregoing, the task of making up $1,677,960 by cutting the Coos County budget would be a daunting one for the Budget Committee. There is no fat to cut--we are already down to the bone, and the further cuts that would be needed to make up for the lost revenues would require us to start eliminating the bones themselves.

26. Coos County has nowhere to turn for replacement revenues. Coos County is 85% forest land. The 248,446 acres that are in Federal ownership (which is 24.1% of the County's total timberland) contributes nothing to the support of services if timber is not harvested.

27. Aside from fees, the only revenue source within the

power of the County is property taxes, and that only with voter approval and either an operating levy or a new tax base, which would be subject to the new property tax limitation known as Measure 5. Most of our urban areas within the County are already up to the maximum allowable taxing limit, which means only the rural areas could be increased. This inequity plus the difficulty in passing any kind of a levy or tax increase during times of high unemployment would render it futile to even attempt an election.

28. In the past three years about six million dollars worth of industrial property (sawmills) have been taken off the tax roles. This is principly because reduced allowable cut on Federal Lands has deprived them of their supply of raw materials. If additional mills close and more industrial properties are taken off the tax roles, it would mean a further shift of the burden to finance services to the home owner.

29. Coos County also manages a 14,000-acre County forest. This forest is in a high site growing area and is managed on a sustained-yield basis on a 70-year cutting cycle. In keeping with achieving that sustainability in harvest we have been selling timber from approximately 160 acres each year. The amount of revenue to the County General Fund depends on the timber market. Sales during fiscal year 88-89 were $1,959,884, for 89-90 were $1,675,645, for 90-91 $2,642,850 and for 91-92 approximately $1,600,000 (which is the first

year exporters were excluded from bidding). If we were to attempt to make up the shortfall from increased harvest in the County forest we would be borrowing from the future when the allowable cut would have to be drastically reduced.

30. Coos County has a work force with the skills and equipment to harvest trees, safely, effectively and with the least environmental damage. These are largely skills developed and handed down from one generation to the next. Once the equipment is sold, the mills scrapped and the heritage lost, there will be no returning to a sensible and productive use of our forest resources. A culture, once lost, cannot be restored. There must be extraordinarily strong evidence of an ecological disaster before an active way of life is sacrificed.

31. Failing to sell the "jeopardy" sales in Coos County will result in the loss of over 180 woods product jobs and a total loss of more than 430 jobs. Unemployment is high in Coos County and getting higher. Efforts at job retraining are producing diminishing returns. Coos County is teetering on the brink of a full scale depression, and loss of an additional 430 jobs would put it well over the edge and plunging into the abyss.

32. The people who are already out of work have exhausted their options of reemployment here. A fancy scientific study is not necessary to establish what is happening to the long-term unemployed in Coos County. I stopped by the U-Haul

trailer rental office; they have more trailers leaving than they do coming in. (Exhibit 9 hereto.) We are contributing to a nation on the move. Dislocated workers are looking for work, they're leaving their home communities, their relatives and family support and when they run out of gas, money and food, they'll become some other community's problem, some other community's homeless, a statistic in some other community's social services.

33. In the view of this County Commissioner, the worst case scenerio would be for the Endangered Species Committee to find that these 44 sales would not threaten the owls' existence if, in doing so, you propose other lands be locked up for the owl in the future. If we are to face continued set-asides and the demise of our forest production on our federal lands and the jobs and revenue it produces, then we may as well stop now. In forest production, if you're not in it for the long haul, you're not in it.

34. Financing for the bulk of our medium to small size timber industry employers have been adversely affected by the listing of the spotted owl. Timber is no longer acceptable collateral at the bank and even operating loans are being called in for lack of security. (Exhibits 10, 11 and 12 hereto.) A positive move by this Committee may help restore some faith on the part of the lending institutions. This is critical to enable small private timber holders to continue to operate. When adequate financing is not available, management

options are limited, forcing the exchange of collateral for cash or premature harvesting of timber.

35. A continued, predictable maximum sustainable harvest level on BLM land in Western Oregon is vital to County revenues and to the jobs it creates. It also provides a needed product, which will come from somewhere, ~~and our forest practices are more environmentally sound than any place else in the world.~~ The importance of these issues to Coos County is very great; and leads me to offer testimony on points for which I have no academic expertise, but which nevertheless should be brought forth.

36. There is increasing information that the owls are not confined to old growth but are being found increasingly in second growth. Some of the most dense populations of owls have been found in not only our second-growth stands but on the more fragmented areas of these stands. Sightings of owls on the Elliott State Forest in Coos and Douglas Counties (Exhibits 13 and 14 hereto.) and the work being done by Simpson Lumber Company and Pacific Lumber Company in Northern California (Exhibits 15 and 16 hereto.) demonstrate that spotted owls are much more widespread than thought just a year or two ago.

37. ~~There~~ is no empirical data to indicate ~~the~~ owl is on the decrease and a lot ~~of~~ information that would indicate just the opposite. I have talked with many loggers who were in the woods in the ~~1920s~~, 30s, 40s, 50s, 60s, and ~~70s~~. These

loggers saw blue grouse, horned owls, screech owls, and every other form of forest bird life--but no spotted owls. Now, spotted owls are seen everywhere, including in second growth and on barnyard fences. This suggests that owls are more numerous now than ever before.

38. Harvesting, burning and replanting produces an even-aged forest not unlike that which nature produced through wildfires in the past. The succession of Douglas Fir forests are a result of fire and the even-aged stand of predominately Douglas Fir that resulted are not unlike those that are being planted today that are said to be monoculture and lack bio-diversity.

39. The timber on the tax rolls in Coos County in 1930 was 91% Douglas Fir (also called yellow fir), 2.9% Spruce, 2.7% White Cedar, 2.1% Hemlock, .3% White Fir and .5% Red Cedar. ~~That is naturos monoculture~~. (Exhibit 17 hereto.)

40. Preserving the old-growth forests of the Northwest because of their value as a carbon sink is a nice theory, but unless, through designed harvest, there is a reduction of fuels, they will be reduced in time by wildfire. Wildfires in the past have burned huge areas, time after time. The "sea" of old-growth timber envisioned by some was not a condition in nature, but was the result of man's intervention with fire suppression. Even with modern fire suppression, there will be losses. We believe it is better to have the benefit of the timber rather than bank it for fuel in inevitable forest

fires.

41. Artificial nests are being used successfully and make better sense than keeping all the old growth, hoping it may develop cavities appealing to the owls' nesting instincts. (Exhibit 16 hereto.)

42. While neither my fellow commissioners nor I can be considered expert witnesses, we all have backgrounds in logging, and would like to respond to the B Series of questions in Column 3, Page 57635, No. 219, Vol. 56 of the Federal Register. The answers to these questions are of such common knowledge that no documentation or supporting evidence is needed.

a.B.1

Q: Clearcutting is the proposed harvesting technique for the 44 sales. What other methods of harvesting could be used on some or all of the tracts that would reduce the impacts on the northern spotted owl?

A: On our terrain, any other method would result in additional earth disturbance and a reduced recovery rate for Douglas Fir. It could be argued the "New Forestry" could be employed, however New Forestry resembles what the big outfits used to do when they took the best and left the rest to rot. This is very old Forestry and very poor Forestry. Some wild life trees and snags could be left.

b.B.2

Q: What would be the economic impacts of alternative methods of harvesting? Would the timber be more expensive to harvest? If so, how much more expensive? If there are increased harvesting costs, will they be reflected in the price of processed timber? Regionally? Nationally?

A: Increased harvest cost will first be reflected in a decrease in the amount of money the bidder is willing to pay. This results in a decrease in both County and Federal revenues.

c.B.3

Q: Would employment and income be different in the counties in question under alternative methods of harvesting?

A: Income to the County's general fund would be less.

d.B.4

Q: Could the U.S. Forest Service increase its harvest by 224 million board feet in Western Oregon? Do private timber companies have the flexibility to increase their harvest in the short run? Are there readily available domestic sources of timber in other States that could quickly meet the Bureau of Land Management "deficit" of 224 million board feet.

A: Under present restraints in harvest, due to the listing of the Owl, the forest service is having a difficult time finding sales it can put up to meet its

own allowable sale quantity. Experts are doubtful that private timber will make up any significant portion of the shortfall

e.B.5

Q: What non-economic effects or benefits other than the impacts on the northern spotted owl would be associated with harvesting these tracts by clearcutting?

A: Clearcutting, if conducted properly, is the best method to reduce earth disturbances and erosion because it allows for a minimum amount of roading, and that on the ridges where twice as many preferred side casting opportunities exist and the least possible amount of storm water to deal with.

In addition it provides the opportunity for high lead logging up hill so that the log is transported to the landing with only one end or none of the log touching the ground.

This method easily facilitates protection of the riparian zone, minimizes blow down, so often associated with selective cutting and earth disturbances associated with up rooting during blow down.

Another non-economic benefit is safety to the fallers and logging crew, who are unnecessarily exposed to

the dangers of snags, leaning trees and related hazards on a partial or selective cut.

f.B.6

Q: What would be the non-economic effects or benefits associated with harvesting these tracts with techniques other than clearcutting?

A: None

g.B.7

Q: What would be the non-economic effects or benefits associated with potential alternative courses of action?

A: To not harvest these 44 sales would be to not only deprive humanity of the use of a crop that is mature and ready for harvest, but will deprive future generations of the new crop that could be planted and grown for them.

Virgin timber stands sold in our Federal forests in Oregon have been averaging about 42 thousand board feet per acre. 65 year old natural stands in our Coos County forest have been yielding upwards to 50 thousand board feet per acre.

After a certain time a stand of timber has no gain of total wood fiber. Since the amount of carbon taken out of the atmosphere is in direct proportion to the amount of wood fiber produced, any delay in the harvest of a mature stand and preparation for

replanting is a delay in the ability of a forest to produce a net gain for the atmosphere.

According to the Coastal Oregon Production Enhancement project, there will also be an increase in summer time stream flow for 7 or 8 years after a clear cut in our coastal forests until the root systems of the new planting fully permeate the reservoir layer.

43. In the midst of the owl vs. jobs controversy two partly true statements continue to be bantered around by those who would defend set-asides for the owl and minimize their effect on jobs: That automation has put more people out of work than the owl, and that banning the export of raw logs could make up for the jobs lost due to set asides.

44. The statement that automation has put more people out of work than lack of supply could certainly be true if you go back far enough. Commerce, as we know it today, is the result of advancement in basically two areas; automation and transportation. In over 200 years of the free enterprise system competition has put firms and people out of work as those with location and efficiency advantages have taken markets from those unable to compete. While the increasing ease of transportation has leveled some of the location advantages, efficiency or increased automation has been a major determining factor in the survival of industries and their employees. This is true in the wood producing industry and of course it can not all be viewed as bad.

45. Positive things happen when automation replaces people in an operation in a free market system. First the remaining worker produces more with an hour's labor and therefore can purchase more with one hour's labor. Second while someone may lose a manual job someone else somewhere may be hired to build the automation, and someone locally may be hired to run or service the machinery.

46. Obviously, if we went back to 1854 to the first rip-sawmill on South Slough when the logs were sawed by hand it would employ many more people to saw a million board feet of lumber than today, but one also has to compare the worker's purchasing power. In 1905 my grandfather was delivering milk to the workers at the Simpson Lumber Co. in North Bend, Oregon for 6 cents a quart (24 cents a gallon). Of course the cows were being milked by hand and the milk brought to town by boat. Payroll at the Simpson Lumber Co. was $2.00 per day per worker for a 10 hour day. In other words it took over one hour labor to buy a gallon of milk. Today a worker can buy 5 gallons of milk with an hour's labor.

47. In 1946 logs were bringing between $2.00 and $5.00 per thousand on the stump and sawed lumber was bringing between $40.00 and $50.00 per thousand. Today stumpage prices and sawed lumber prices are often nearly equal, the mill operation and profits coming out of the overrun.

48. Obviously automation has had something to do with the laying off of wood product workers and the shutting down of

some mills, but the figures presently being used to gauge the number of workers per million board feet of harvest and the multipliers are up to date figures. When applied to the reduced harvest over the past three years the results come very close to the loss of wood product jobs lost during the same time.

49. 300 million board feet of logs are shipped out of the Port of Coos Bay annually. It they were not allowed to be exported, they could have kept one of our larger mills running. And while neither Coos County or the State of Oregon has the right to ban log exports, if it were done it would have negative effects as well. The export of 300 million board feet creates about 270 jobs in the local area, and additional jobs outside of the area. If it were milled locally the number of jobs might be higher than 270, but who is to say it would even be logged. There are private logs from private lands owned by operators, small and large, who look to sell to the highest bidders. It is up to them when and where they choose to sell their logs. Without the export premium, they might not log at all. With the export premium, there is additional cash injected into the economy by the growers who receive the premium, thereby supporting additional indirect and induced jobs.

50. The O&C funds make up 27 percent of all general fund revenues and, in theory, they make up 27 percent of general fund dollars going into each department. But in reality they

make up 100% of the general fund expenditures of any program the budget committee decides to cut to balance the budget due to a reduction of O&C funds.

51. Because many services are mandated by law, it is those that are not mandated that will be the first cut and those cut services are the ones people depend on. In many cases a few local dollars leverage state and federal dollars but when those cuts are too deep that money will be lost. Many of the County roads and bridges that the Federal logs go to market on were built with 10% general fund dollars, 10% state and 80% federal but we have to have the 10% local funds to accomplish this. The infrastructure for commerce and emergency services depends on continuing to upgrade our bridges and road systems.

52. It is unrealistic to say that a $1,766,900 reduction would simply be a percentage out in each department. I could ask our people to all take a 10% cut in pay if it were for a better reason than that 44 sales might threaten the spotted owl. They willingly took wage freezes in the past when in the mid 1980's people were out of work in a recession, but at the present I feel more obligated to make my case before the Endangered Species Committee than before them.

53. Nearly all attempts to diversify the economy have failed. We tried to get a state prison that would have hired 800 people. We were the only county in Oregon that wanted it, but it went to Ontario (now the state has no money to run it

anyway). We tried to get a pulp mill that would have employed 300 people but it went elsewhere while we were trying to get through the permit process. This year we encouraged farmers to try potatoes and build a packing shed. They invested $105,000 in the shed and $200,000 planting potatoes, then the price dropped so low they couldn't afford to dig the potatoes. The only job opening in town right now is a County Commissioner and with 11% unemployment it should be an interesting race.

54. Attached hereto as Exhibits are the following documents:

Exhibit No.	Document Description
1	Statement of Mary Ann Wilson, Coos County Clerk
2	Affidavit of Carolyn Sumstine, Chief Financial Specialist
3	Affidavit of Allen A. Swenson, Coos County Assessor
4	Affidavit of Paul Burgett, Coos County District Attorney
5	Statement of Gary Combs, Coos County Parks Department
6	Statement of Patty Evernden, Coos County Planning Department
7	Statement of Ed Jones, Coos County Juvenile Department
8	Statement of Dr. G. R. Bassett, Coos County Health Department
9	Letter from Tom Ross dated 12/16/91
10	Letter from Toni Poole dated 12/16/91

11 Letter from Bill Castle dated 12/18/91

12 Letter from Bankers Association dated 12/23/91

13 Letter from Oregon Department of Forestry dated 12/18/91

14 Letter from Jerry Phillips dated 12/17/91

15 Affidavit of Tharon E. O'Dell dated 12/19/91

16 Letter from Pacific Lumber Company

17 Article from Coos Bay Times (circa 1930)

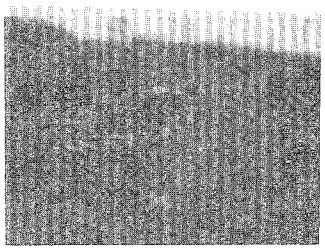
55. I would like to thank the Endangered Species Committee for their consideration of Coos County's concerns. It is Coos County's position that there should be a continued management primarily for timber production and a harvest rate on the O&C land that is sustainable, providing a predictable supply of timber and revenues and that by using best management practices all the forest resources will be conserved.

Gordon Ross

SUBSCRIBED AND SWORN to before me this 23rd day of Dec., 1991.

OFFICIAL SEAL
DIANNA DAGUE
NOTARY PUBLIC - OREGON
COMMISSION NO. 010499
MY COMMISSION EXPIRES NOV. 19, 1995

Notary Public for Oregon
My Commission Expires: 11/19/95



Rod Greene shows one years growth at Long Rock Timber Co. plantation near Coos Bay

Q&A

Do growth rates exceed harvest rates in Oregon's forests?

Answer: **Yes, growth rates exceed harvest rates, though it is important to understand how growth and harvest are influenced by land management objectives.**

Most private forest landowners in Oregon are in the business of growing trees for harvest. By contrast, agencies responsible for protecting publicly-owned forests, pursue multiple management objectives. Their job is to integrate resource management plans for every forest resource, including timber, fish, wildlife, water, plants, air, and year-round recreation opportunity.

Federal law prohibits harvesting in excess of what forests can grow under management regimes called for in forest plans. Here in the Pacific Northwest, where federal forests are among the most productive in the world, harvest rates are but a fraction of what the forests could produce if they were managed primarily for sustained yield timber production.

Private forest landowners must replant promptly but are not required to abide by "sustained yield" laws applicable on federal lands, though as a practical matter, most private landowners manage their lands with great care and skill. Oregon state records reveal virtually all private forest landowners promptly replant their lands, to standards that meet or exceed what the State requires.

The bar graphs below tell the story of growth and harvest on all U.S. forest ownerships, as well as the national forest system.

U.S. growth and removals

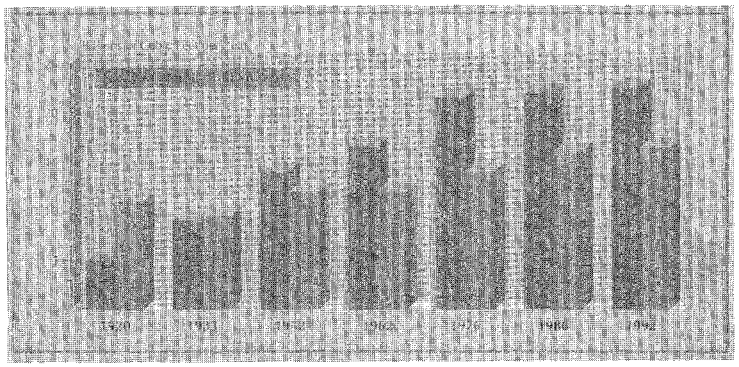


Fig. 12 This bar graph portrays timber growth and removals in America's forests from 1920 through 1986. In 1920, harvest rates were double the rate of forest growth; but by 1952, net annual growth had exceeded net annual harvest, and by 1986, net annual growth was 3.5 times what it was in 1920. In 1992, net growth for all ownerships and regions in America was 21.6 billion cubic feet, and harvest was 16.3 billion cubic feet. Net annual growth is defined as total growth, minus what is lost to insects, disease and fire.

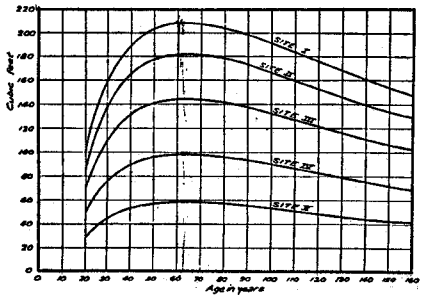


FIGURE 11.—Mean annual increment per acre in cubic feet for total stand

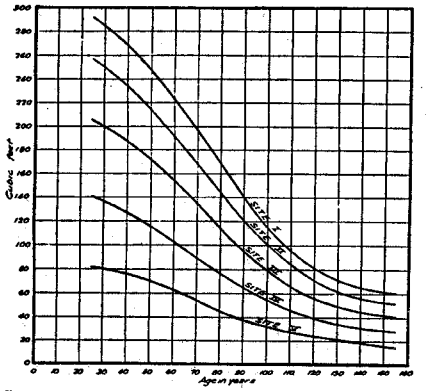


FIGURE 12.—Periodic annual increment per acre in cubic feet for total stand. Ten-year periods are used

The periodic annual increments, by 10-year periods, are given in cubic feet, International board feet, and Scribner board feet in Table 10, and are also illustrated in Figures 11 to 16.

TABLE 10.—*Periodic annual increment on a fully stocked acre according to three units of measurement: (1) Cubic feet; (2) board feet, Scribner rule; and (3) board feet, International rule (⅛-inch kerf)*

CUBIC FEET[1]

Age period (years)	Site class I	II	III	IV	V	Age period (years)	Site class I	II	III	IV	V
20 to 30	292	256	205	140	81	90 to 100	127	110	87	60	33
30 to 40	278	243	194	133	78	100 to 110	108	92	72	50	29
40 to 50	258	225	180	121	73	110 to 120	89	77	61	42	26
50 to 60	236	203	163	109	66	120 to 130	76	66	53	37	23
60 to 70	210	180	145	98	59	130 to 140	66	58	47	33	21
70 to 80	182	156	126	85	52	140 to 150	58	51	43	30	19
80 to 90	155	133	106	71	44	150 to 160	51	45	41	28	18

BOARD FEET, SCRIBNER RULE[2]

20 to 30	780					90 to 100	1,020	940	780	540	270
30 to 40	1,655	930	430			100 to 110	870	760	660	440	220
40 to 50	1,900	1,540	760	310		110 to 120	740	650	560	360	245
50 to 60	1,905	1,550	1,140	600		120 to 130	645	560	500	295	230
60 to 70	1,825	1,540	1,160	845	190	130 to 140	575	520	455	255	220
70 to 80	1,630	1,390	1,050	810	300	140 to 150	520	485	410	325	205
80 to 90	1,330	1,165	930	668	250	150 to 160	480	450	380	300	200

BOARD FEET, INTERNATIONAL RULE[3]

20 to 30	1,890	1,220	840			90 to 100	1,100	970	830	580	290
30 to 40	2,260	1,850	1,370	700		100 to 110	900	810	690	500	230
40 to 50	2,320	2,000	1,530	960	340	110 to 120	760	680	570	430	210
50 to 60	2,060	1,820	1,490	1,000	450	120 to 130	650	590	500	370	210
60 to 70	1,808	1,600	1,340	990	490	130 to 140	580	530	450	345	220
70 to 80	1,540	1,390	1,160	790	490	140 to 150	535	490	420	320	210
80 to 90	1,320	1,170	990	680	460	150 to 160	480	440	380	300	200

[1] Volume in cubic feet includes all trees.
[2] Volume in board feet by the Scribner rule includes only those trees 12 inches or more in diameter.
[3] Volume in board feet by the International rule includes only those trees 7 inches or more in diameter.

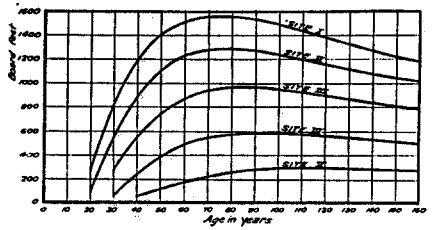


FIGURE 13.—Mean annual increment per acre in board feet by the International log rule for trees 7 inches in diameter and larger

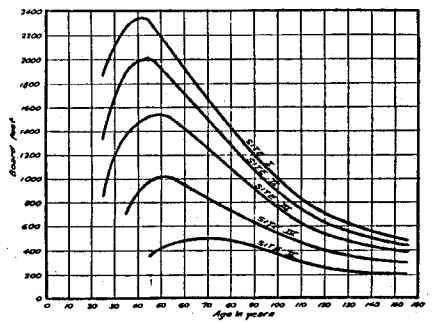


FIGURE 14.—Periodic annual increment per acre in board feet by the International log rule for trees 7 inches in diameter and larger. Ten-year periods are used

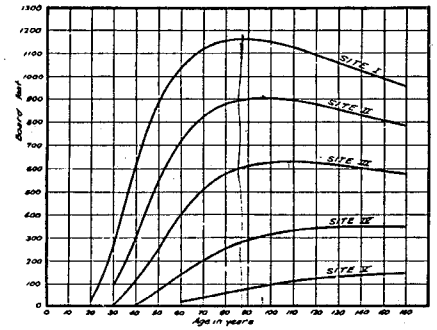


FIGURE 15.—Mean annual increment per acre in board feet by the Scribner log rule for trees 12 inches in diameter and larger

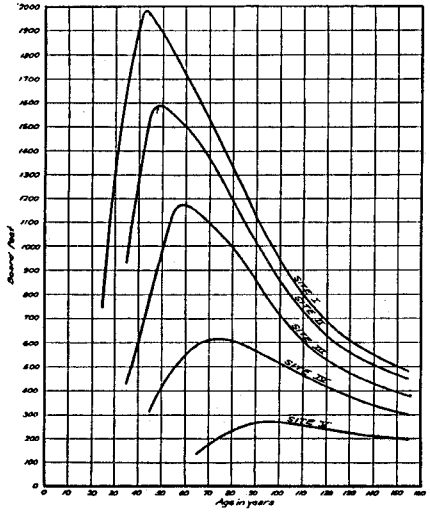


FIGURE 16.—Periodic annual increment per acre in board feet by the Scribner log rule for trees 12 inches in diameter and larger. Ten-year periods are used

The mean annual increments indicate for any given age of stand the average yearly increase in volume per acre up to that age. That is, if a forest on Site I were cut at 40 years of age, the average yearly increase in volume would be only 188 cubic feet per acre; if cut at 60 years, the average yearly growth would be 208 cubic feet; or if cut at 100 years, 191 cubic feet per acre.

The rate of volume growth is not constant throughout the life of a forest; hence the average annual increase in volume reaches a maximum and thereafter diminishes. Thus a forest on Site I reaches the maximum of average annual increase in Scribner board-foot volume at about 90 years of age.

HOW MUCH OLD GROWTH CAN WE SAVE?

Is Biodiversity Being Achieved In Our Managed Forest?

Prepared for presentation to:
The Department of Interior

by:
Gordon Ross
Coos County Commissioner

April, 1993

"In a very adept manner, combining factual information with excellent photographs, you present a very persuasive argument for people to seriously rethink the crusade to preserve the Old Growth Forests"

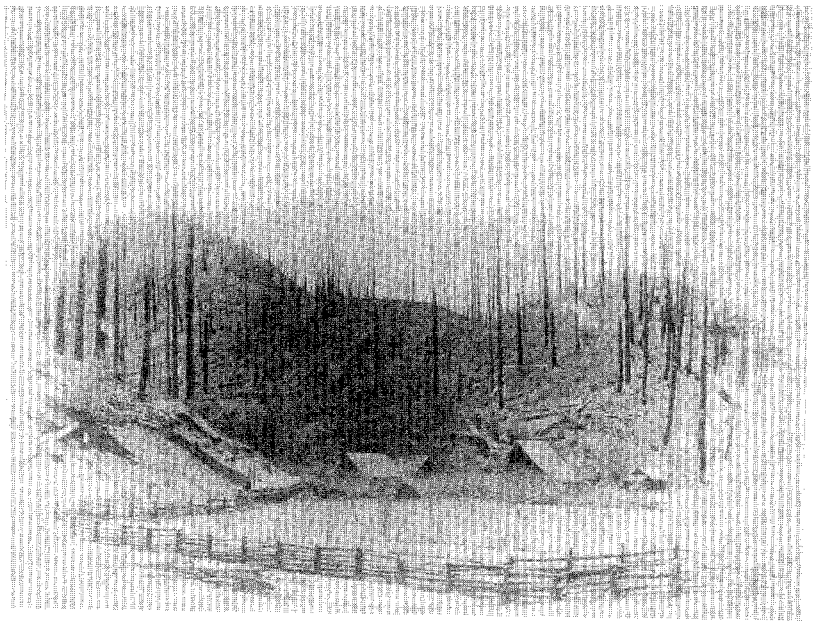
George Smith
Acting Executive Director
Regional Ecosystem Office

How Much Old Growth Was There?

Was the Northwest a sea of Old Growth Forests from the Cascades to the Pacific when white man came west? Anecdotal evidence tells us it was not, but now we have the Bureau of Land Management fire maps that support that evidence.

Foresters know of the past as they read the history written in the annual rings of the forest. This history not only opens to us the past, but also gives us a look into the future. The BLM fire maps indicate at times as little as 20% of the forests were over 200 years old and that, based on the performance of the past, we could expect catastrophic fire every 150 to 200 years in any given area.

When Robert Gray sighted the coast of Oregon in 1792, he wrote in his journal that he could not put ashore because of all the smoke and the many fires. When the early settlers came to Coos Bay, they were told by the Indians of the "Skookum Fire" after which the bay turned yellow and the little native oyster died. From that time until now is a history of trying to "Keep Oregon Green."

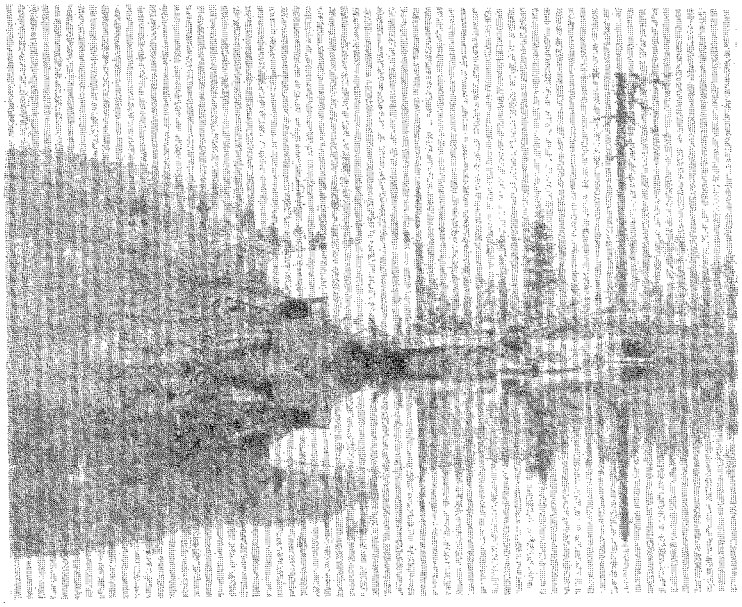


Fire of 1868 at the site of the Elkhorn Ranch, now within the Elliot State Forest.

This 300,000 acre blaze that forced settlers from their homes and destroyed wildlife was typical of the scope of many of the catastrophic fires of the past referred to in the BLM fire maps.

Here, as in many other places after catastrophic fire, reburns as late as 20 to 30 years after the original burn were extensive because of the large amount of fuel loading left by the first fire and the punky sap wood breaking off, as pitchy snags explode, acting as fire brands driven ahead by the wind of the fire and igniting ahead, hastening the speed of the fire or sometimes creating its own back fire.

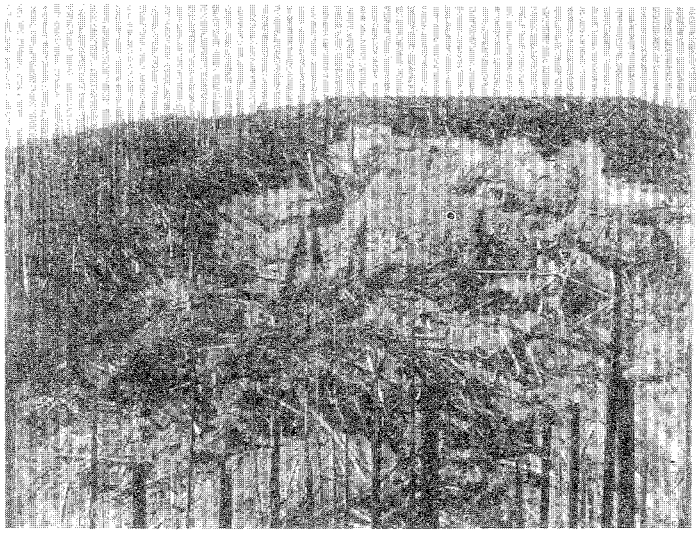
The buildings in this picture were built after the original fire.



My forbearers protected their homes against the fire of 1868 which jumped the South fork of the Coos River at this point. This fruit drying facility was built by my mother's grandfather in 1876, eight years after the fire. When my grandfather moved over the hill to Stock Slough in 1882, he said there wasn't a tree on the hills taller than his shoulder. In 1946 he sold merchantable timber measuring as much as 40" on the stump.

In 1874 two reporters from Coos Bay walked to Sumner, a distance of 11 miles, to review the work on the Coos Bay Wagon Road. They reported not seeing a live tree.

Again, how much old growth CAN we save?



Large Slide Into Marlow Creek After Fire of 1868

While small scale logging in any given watershed in any given year was designed as a good management practice to lessen the impact on a total watershed, this practice is now drawing attention as "Fragmentation." Catastrophic fire brings with it no such criticism, however with nothing to hold back the water when heavy rains come, rivers are swollen adding sediment to the load from what is our major cause of sedimentation on coastal streams, "streambank erosion." If the angle of repose is too great, erosion at the base of a hill can allow the entire slope to move downward into the basin.

After the Tillamook Burn the entire estuary was sedimented in and Tillamook Bay restoration is still a concern.

If fuel loading is not achieved systematically through harvest, then it is left to nature to do it. And nature, through catastrophic fires, does not set aside riparian zones or special management areas.

I would challenge the reader to consider the benefits to fish and wildlife by reducing the probability of catastrophic fire through roading and harvest using good management practices.

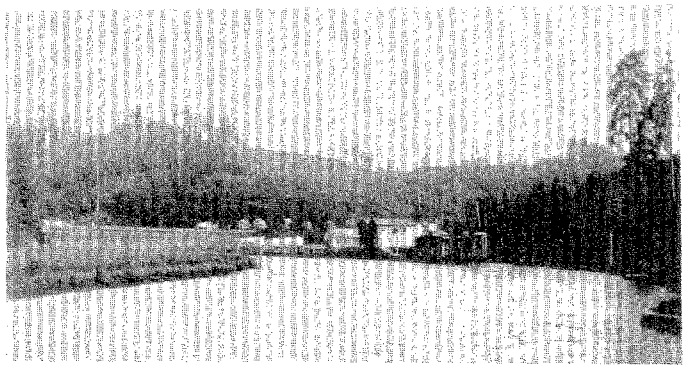
Even-Aged Stand of Fir Coming Back After Fire of 1868.

Even aged stands of Douglas fir denote and date the time of catastrophic fires. From place to place some trees survived and, if these were of simiar age, it helps date the former fire. Local Coos Bay loggers referred to the reprod after the 1868 fire as 3rd growth timber because the forest that was destroyed was of two age classes referred to as 1st and 2nd growth, the latter being that which probably survived the "Skookum Fire."

Again, Douglas fir stands are principally the result of fire and the monoculture produced by them was as typical after fire as after clear cuts. In 1930 a cruise by the County of all its taxable timber showed the percentages to be of each type.

Old Growth Fir	46.6%
Second Growth Fir	44.7%
Port Orford Cedar	2.6%
Spruce	2.9%
Hemlock	2.1%
Red Cedar	.5%
White Fir	.36%

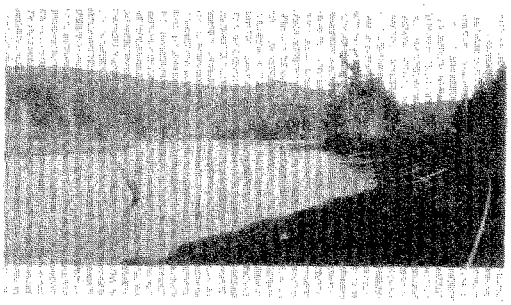
This is nature's biodiversity, or nature's monoculture, (91% fir).



Henryville — Coal Mining on Isthmus Slough
8 Miles South to Coos Bay

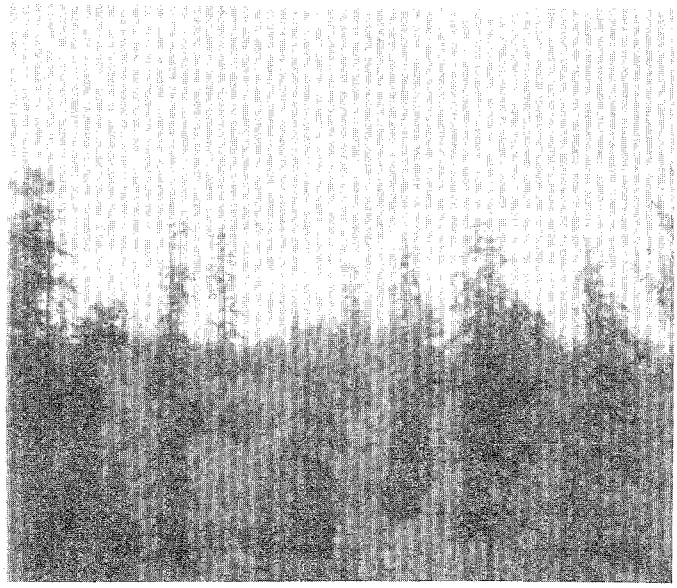
While salvage logging after the fire of 1868 on the banks of Isthmus Slough, coal was discovered and the Henryville mine opened in 1872. This picture, taken around the turn of the century, shows that the snags remaining were too far from the water to have easily facilitated their delivery to the mill using early methods.

This area was then gyppo logged in the 1940's (selective, cut the best and leave the rest), then clear-cut in 1978, leaving a buffer around the salt marshes and water ways. The picture below shows the 4th crop of timber to be produced on this land since Oregon became a state (including the crop that was already here).



Two Even-Aged Stands of Douglas Fir.

God planted the stand in the background and man planted the one in the foreground. Both are predominantly Douglas fir. At the present time more diversity exists in the newly planted area, however, as a closed canopy is produced, only shade tolerant species will remain. My great-grandfather Ross salvage-logged this land after the fire of 1868 with oxen. That means the two people in the foreground are third and fourth growth. (They show no genetic improvement.)



A Forty Acre Site on the North Fork of the Coquille River Near Rock Prairie that has been Undisturbed by Fire for 350 Years

The Fir trees that remain standing are all approximately 350 years old. Many have fallen and hard woods have come up to fill in the space. For a period of 350 years no new fir trees have come up through the under story. If no disturbance opens up this area (i.e. fire or logging) the future of this site will be a hard wood forest.

If we could be successful in setting aside all Federal timber land from harvest, and if we could protect it from fire, we would be producing a forest for the most part very different from what nature produced.

August 30, 1993

Mr. Gordon Ross
Coos County Board of Commissioners
Courthouse
Coquille, Oregon 97423

Dear Commissioner Ross,

Herewith is a map of Coos County on which I have color-coded the major forest fires of the past - to best of my knowledge and ability. This subject has been of interest to me during my entire career in Forestry in Coos County, and I have tried to build this knowledge over these many years.

I am a professional Forester, with a Bachelor of Science Degree in Forest Management from Oregon State University. My career spanned some 38 years, 37 of which were in Coos County, with the Oregon State Board of Forestry. During the 19 years prior to my retirement I was the District Forester for the Coos District, including being the Manager of the Elliott State Forest. Forest fire prevention and control is one of the main missions of that organization.

My reason for writing is that I have a deep concern about the future viability of the forest resources of Coos County from the standpoint of fire protection. This stems from the current political moves to severely curtail forest harvesting on public ownerships. And my guess is that almost 300,000 of the 800,000 acres of forestland in Coos County are publicly owned.

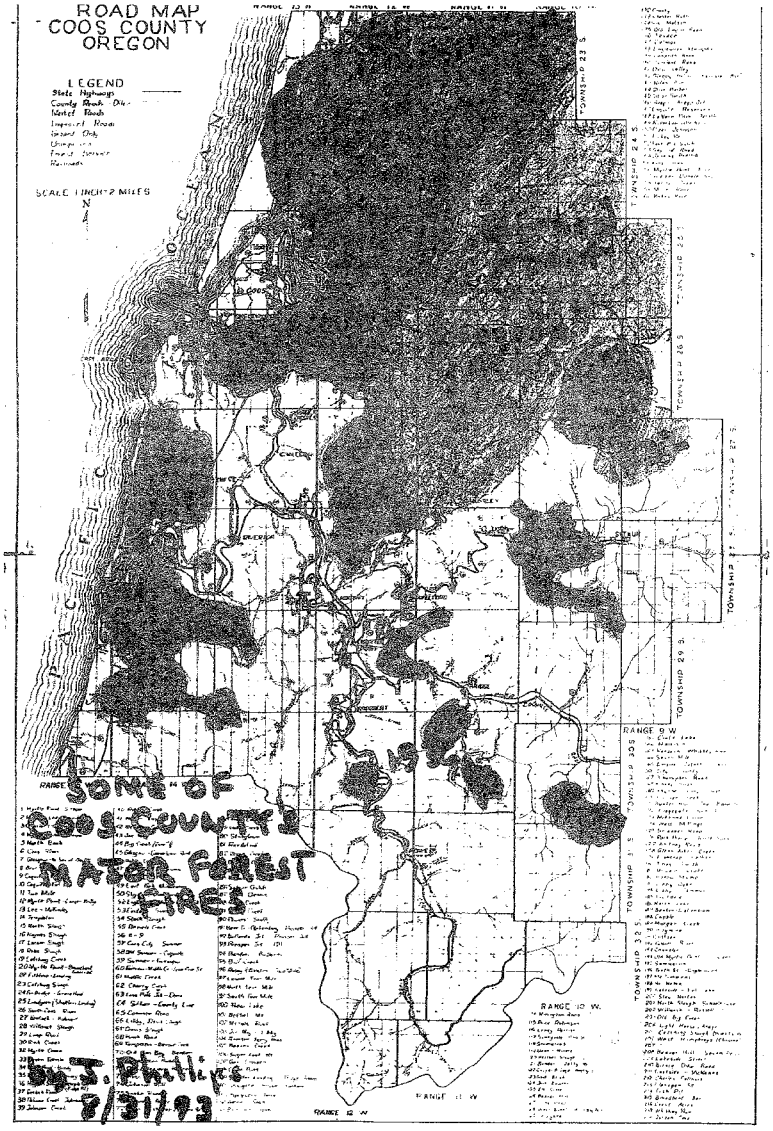
My concern is over progressive "fuel build-up," resulting from decreased harvesting of over-mature timber. Fire professionals speak of the "fire triangle," which, of course, consists of air, heat, and fuel. We cannot, in a forest potential fire situation, control the air, or the heat (lightning, for example), but we can "manage" the fuel loading, largely through harvest of older, highly inflammable Douglas-fir timber.

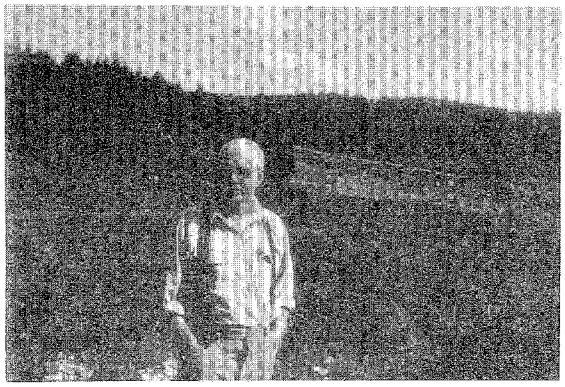
All of Western Oregon's major historic forest fires have occurred in those overmature Douglas-fir timber stands. And, in spite of all modern fire suppression techniques and money spent, they may continue if the fuel loading is not managed (witness the 1987 Silver Fire on the nearby Siskiyou National Forest, covering some 100,000 acres of older timber stands.)

A final point: the Oregon State Dep(t of Forestry has one of the Nation's most effective fire suppression organizations. It is based on immediate response with heavy equipment and skilled personnel - much of which must come from logging cooperators. Greatly reduced harvesting also greatly reduces fire control ability in all of Western Oregon - including Coos County.

I pray that Coos County's forests will not be jeopardized by poorly thought-out political actions.

Jerry Phillips


ROAD MAP
COOS COUNTY
OREGON
LEGEND
SCALE 1 INCH = 2 MILES
N
RANGE 13 W.
RANGE 12 W.
RANGE 11 W.
RANGE 10 W.
RANGE 9 W.
TOWNSHIP 24 S.
TOWNSHIP 25 S.
TOWNSHIP 26 S.
TOWNSHIP 27 S.
TOWNSHIP 28 S.
TOWNSHIP 29 S.
TOWNSHIP 30 S.
TOWNSHIP 31 S.
TOWNSHIP 32 S.
SOME OF
COOS COUNTY'S
MAJOR FOREST
FIRES
By J. Phillips
8/31/93



I'm standing in eight-year-old Douglas fir reprod. Eight years ago it looked like the clear cut to my left. 50-year-old trees, in the background, grew after the Bandon fire of 1936.

This is a part of the 14,000-acre Coos County Forest. It is managed on a sustained yield basis by three foresters and one secretary for timber production and to maximize revenue. We don't have on staff a single biologist, or a specialist of any other discipline and yet I would put our forest up against any federal lands in Oregon for water quality, fish habitat, wildlife habitat, hunting and recreational opportunities and walk away with the prize.

A large part of this forest comprises a major portion of the watershed for the South Slough National Reserve. Our Forestry Budget is $300,000 and this year it returned $4,300,000 to the general fund.

As a 4-H Forestry Club Member, I helped replant this part of the forest in 1945 and 1946. We only planted conifers but there is plenty of "biodiversity."

Western Pond Turtle on Old Spruce Log

As many as nine turtles have been seen at one time basking on the logs along Ross Inlet. This is also a favorite area for Wood Duck, Buffleheads, Hooded Mergansers and Golden Eye. This area of our farm was salt marsh before my great-grandfather installed a tidal control structure. The pasture provides nesting and feeding opportunities for all kinds of water fowl. On this year's Christmas Day bird count, 27 volunteers counted 220 different species of birds including 15 of the 37 species thought to be closely associated with old forests. The background is typical of most of the surrounding forests, burned in 1868 and logged once or twice since then.

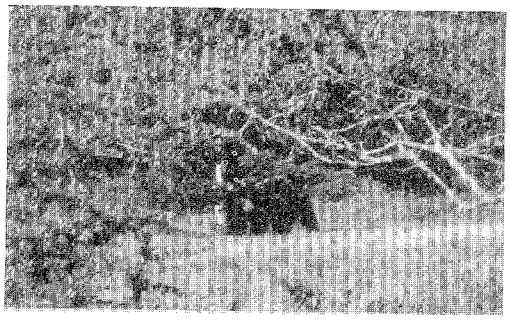
These are the kind of pictures my wife takes out of the kitchen window at the Ross Dairy Ranch. It doesn't take a set aside to have wildlife habitat. This land has been intensively managed for over 130 years by our family.

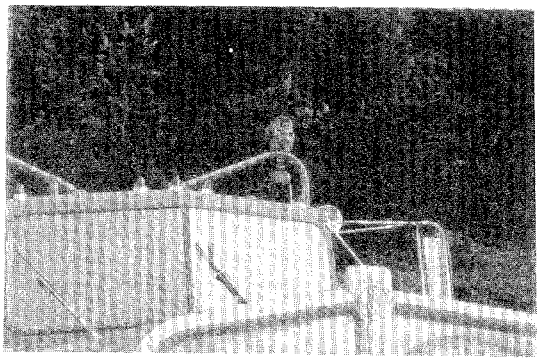
Roosevelt Elk ⇧

Blacktail Fawn ⇨

Black Bear ⇩

A well-managed farm is the best wildlife habitat you can find, and since I've been a County Commissioner, mine is so poorly managed it is even better. I wish I had a picture of the Pileated Woodpecker that eats Wilma's Gravenstien apples every fall.

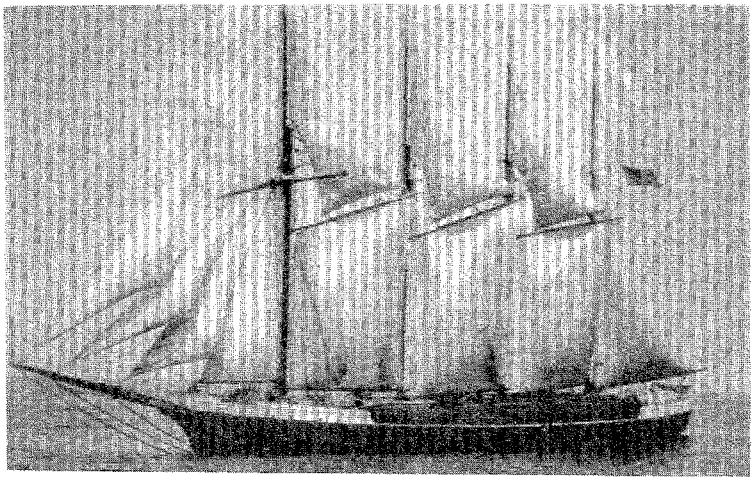




Spotted Owl sitting on cab guard of log truck. It came back the next day and sat on the fuel tank.

The needs of the Spotted Owl may be more varied and flexible than we think. They are being found in timber stands of all ages and the BLM recently found a pair nesting in a hole in a rock on Sandy Creek.

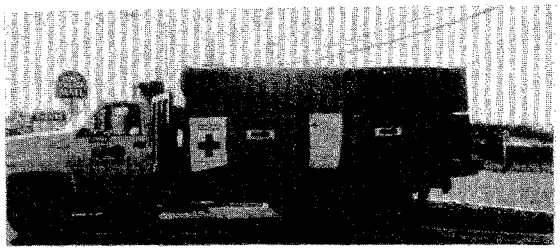
Spotted Owl sitting on my neighbor's corral fence. Maybe it's an Old Growth fence.



Ship loaded with lumber, bound for San Francisco after the Earthquake and Fire of 1906.

Coos Bay Lumber built the San Francisco and rebuilt her after the 1906 tragedy. Spruce lumber from Coos Bay helped with the war effort in 1917. The Spruce Division of the Armed Forces took over operation of our mills, milling the lumber to put thousands of airplanes into the air which helped bring the Kaiser to his knees.

Below, two truck loads of plywood from Coos Bay that helped form a caravan of structural products, a gift from the Northwest, that traveled from Portland, Oregon to South Carolina immediately after hurricane Hugo. We haven't been harvesting timber just for the fun of it. We didn't harvest timber just so we could provide the U.S. with 20% of its softwood needs — but we did. We didn't cut timber just so we could replant seven trees for every one cut — but we did. We didn't harvest timber only so we could help provide affordable housing for Americans — but we have. We have, and with God's help and government's blessing, we would like to continue.



Conclusion

In the last few years we've seen people think up a lot of fancy names and sophisticated buzz words for what us old timers just called the balance of nature and somewhere conservation got mistaken for "preservation" and wise use becomes "extraction" and harvesting becomes "destruction" and we've convinced the nation that we won't have any trees if we don't stop cutting them.

The fact is we won't have any if we do stop cutting them. You can't plant until after you've harvested. It is a cycle and if we don't perform it, nature will. If we do not reduce the fuel loading systematically through a planned harvest, nature will through fire. Think of the benefit to fish and wildlife, to streams and estuaries by preventing catastrophic fire. Not only by fuel reduction, but by maintaining a road system essential in suppressing fire and a health industry of loggers, water wagons and equipment to call on when the need arises (the bureaucracy could never put out a fire by itself). In addition, the harvest tax comes in dedicated to fire suppression.

Harvesting, burning and replanting will more closely resemble the cycle nature produced than will reserves. In addition, we can improve on nature. We can protect our streams and riparian zones and our estuaries. Nature is a good enough provider when man isn't in the picture, but when man has to be provided for, man has to help her out.

How much old growth can we save? At the present time, on our Federal land, we are halfway through a 100-year cutting cycle on the portion that is a part of the "Managed Forest," (about 85% of Interior lands and about 50% of Forest Service lands). If we continue on schedule, 50 years from now we will start over — harvesting 100-year-old trees. If we have to further reduce the area of the remaining managed forest, we can reduce the annual allowable cut by the same proportion and stay on schedule with a reduced A.S.Q.

If we can cut no more old growth, we reduce that flexibility to either harvesting 50-year-old trees, or not harvesting at all until they become older.

This is all assuming we can stay the hand of nature. If we want older trees in some area, we can adjust the harvesting cycle to achieve that. If we discontinue management, nature will manage and we may not be happy with the results.

If we wisely manage our forests, maybe we can save some of the reserves and special areas and especially our riparian areas. But if we try to save it all, history tells us and the fire maps affirm it, we will lose it all.

Should We Gamble with our Forests?

What if we took a gamble and won? What if we tried to save all remaining old growth? What if we could win? What would we have won? An aging forest, oxidizing as fast as it is growing, at most recycling its own carbon with no net benefit to the atmosphere. Would we have won more protection for our watershed and anadromous streams than we can achieve through management and the use of "Best Management Practices"? Will we have protected endangered species and saved biodiversity? If the creatures of the forest could survive the holocausts of nature, and if the biodiversity returned with the next spring, they can surely survive a harvest plan of 1% a year.

And, if we won we would still lose logging jobs; a way of life in the Northwest; communities and revenue for local services. We would lose mill jobs and lumber, and the hope of many young Americans for a home of their own.

What could be the bright spot in the nation's economy would be the dismal one, and the sector that could help will be needing help. Instead of our forest products helping with our balance of trade, they will show a deficit. The jobs, the resources and the revenue, all would be losers, even if we win.

But, what if we lost?